

**GOVERNMENT OF THE
GOLD COAST.**

REPORT

ON THE

**Medical and Sanitary
Department**

FOR THE YEAR ENDED

APRIL, 1926—MARCH, 1927.

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THE GOLD COAST

UPPER VOLTA

NORTH TERRITORIES

WESTERN TERRITORIES

EASTERN TERRITORIES

Legend:

- International Boundaries
- Colonial
- Motorable Roads
- Railways Constructed

SCALE 1:2,000,000.

MILES 10 5 0 10 20 30 40 50 MILES

Reproduced at Survey H.Q. Accra, 1928.

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Report on the Medical and Sanitary Department for the year 1926=27.

I.—ADMINISTRATION.

STAFF—EUROPEAN.

Promotions.—Dr. P. D. Oakley, Medical Officer, was promoted Senior Medical Officer on the 20th July, 1926, Dr. M. B. Hay, Medical Officer was promoted Senior Sanitary Officer, Sanitation Branch, on the 24th July, 1926.

Appointments.—Drs. M. MacSweeney, A. J. Hawe, F. S. Paterson, D. Lennox, L. D'A. Quigley, F. McKernan, V. J. G. MacGregor, W. Chisholm, and H. S. Townsend were appointed during the year as Medical Officers.

Mr. D. H. Brayne was appointed as Radiographer.

Miss M. A. A. Swynnerton, Miss M. M. E. Brodrick and Miss E. D. Highan were appointed as Nursing Sisters.

Other changes in the Staff during the year.—Dr. M. E. O'Dea, Director of Medical and Sanitary Services, retired on pension on the 18th March, 1927.

Dr. G. E. H. Le Fanu, Medical Specialist, retired on pension on the 24th September, 1926.

Drs. W. M. Wade and G. J. W. Keigwin, Senior Medical Officers, retired on pension on the 21st December and 8th June, 1926 respectively.

Dr. G. Robinson, Medical Officer was seconded for service with the Medical Research Institute as Assistant Pathologist for two years from the 1st April, 1926.

Mr. L. M. Forsyth, Radiographer, resigned on the 20th March, 1926.

Mr. C. N. C. Field, Secretary, Gold Coast Hospital, was transferred to the Treasury Department on the 9th October, 1926.

Miss A. J. Raine, Nursing Sister, resigned as from the 12th March, 1927 and Miss G. L. Baynes and Miss M. M. Burke, Nursing Sisters, terminated their appointments on the 1st February, 1927, and 20th November, 1926, respectively.

STAFF—AFRICAN.

Appointments.—Dr. E. Tagoe was appointed Junior African Medical Officer on the 1st September, 1926.

Promotions.—Dr. E. Tagoe, Junior African Medical Officer, was promoted African Medical Officer on the 1st January, 1927. Mr D. B. Odonkor, 1st Division Dispenser, was promoted Chief Dispenser on the 2nd December, 1926. Mr T. B. Ashong 2nd Division Dispenser, was promoted 1st Division Dispenser on the 2nd December, 1926. Mrs S. Dicks, 2nd Division Nurse, was promoted 1st Division Nurse on the 1st April, 1926. Mr. W. D. Jones, 2nd Division Nurse was promoted 1st Division Nurse on the 13th May, 1926. Mr. H. W. Tagoe, Assistant Chief Attendant, Lunatic Asylum, was promoted Chief Attendant on the 10th October, 1926. Mr W. Nikue, Attendant, Lunatic Asylum, was promoted Assistant Chief Attendant on the 23rd February, 1927.

Other changes in the Staff during the year.—Dr. G. J. D. Hammond, African Medical Officer, was invalided from the service on the 3rd February, 1927.

Mr. W. B. Hagan, Chief Dispenser, retired on pension owing to ill-health on the 2nd December, 1926. Mr. B. C. Brown, 1st Division Nurse, retired on pension on the 13th May, 1926.

Mr. J. W. Ephraim, Chief Attendant, Lunatic Asylum, died on the 9th October, 1926.

Mr. J. M. Braid, Assistant Chief Attendant, Lunatic Asylum was dismissed on the 23rd February, 1927.

HYGIENE AND SANITATION.

(I).—ADMINISTRATIVE.

(a) EUROPEAN STAFF.

Dr. G. J. Pirie, Deputy Director of Sanitary Services, who proceeded to Great Britain *via* Dakar on the 11th of March, 1926, was promoted to the post of Deputy Director of Sanitary Services, Nigeria, on the 17th of June, 1926.

Dr. W. G. Watt, Senior Sanitary Officer, acted as Deputy Director of Sanitary Services throughout the whole year under review.

Dr. P. S. Selwyn-Clarke, M.C., Senior Sanitary Officer, returned from leave and resumed duty as Senior Sanitary Officer on the 6th of July, 1926.

Dr. G. C. M. Davis, M.C., Medical Officer of Health, was promoted Senior Sanitary Officer, Nigeria, on the 13th of April, 1926, and proceeded on leave on the 31st of July, 1926.

Dr. J. A. A. Duncan, M.C., Medical Officer of Health, was on duty for the whole of 1926-27.

Dr. P. A. T. Sneath, Medical Officer of Health, proceeded on leave on the 24th of October, 1926, and resigned from the Service on the 19th of March, 1927.

Dr. W. M. Howells, Medical Officer of Health, proceeded on leave on the 16th of January, 1927.

Dr. H. C. E. Quin, Medical Officer of Health, proceeded on leave on the 23rd of May, 1926, and resumed duty on his return from leave on the 13th of October, 1926.

Dr. G. L. Ranking, Medical Officer of Health, who assumed duty on the 10th of June, 1925, died of yellow fever on the 24th of April, 1926.

Dr. A. Heron, Medical Officer of Health, proceeded on leave on the 27th of March, 1927.

Major M. D. Ahern, Medical Officer of Health, proceeded on leave on the 14th of August, 1926, and was restored to his British unit as from the 15th of February, 1927.

One vacancy in the grade of Senior Sanitary Officer was filled by the transfer of Dr. M. B. Hay, from the Medical Branch. This officer assumed duty as Senior Sanitary Officer on the 24th of July, 1926, and proceeded on leave on the 26th of February, 1927.

Two vacancies in the grade of Medical Officer of Health were filled by the transfer of Dr. A. Heron from the Medical Branch and of Dr. D. Lennox from the Medical Branch on the 18th of August, 1926.

Five vacancies in the grade of Medical Officer of Health remain to be filled. The shortage in this grade is acute and representations are being made to have these vacancies filled as speedily as possible.

Dr. N. A. Vane-Percy, Lady Medical Officer, proceeded on leave on the 11th September, 1926, and was on leave during the remainder of the year.

Dr. A. M. K. O'Halloran, Lady Medical Officer, returned from leave and resumed duty on the 15th of September, 1926.

Dr. M. C. Chappel, Lady Medical Officer, proceeded on leave on the 4th of December, 1926.

Dr. A. Downing, Lady Medical Officer, was appointed and assumed duty on the 27th of October, 1926.

During the period under review eleven Superintending Sanitary Inspectors were on duty except for short periods owing to leave or sickness.

One additional officer of this grade has been provided for in the Estimates for 1927-28.

(b) AFRICAN STAFF.

The following additions to the African Staff were made during the year :—

Ten Sanitary Inspectors-in-Training, two Village Overseers, and two Nurses in-Training.

Mr. C. T. Beckley, Vaccinator, resigned.

Mr. A. C. Vanderpuye, 2nd Division Sanitary Inspector, had his appointment terminated.

It is noted with regret that the following members of the Sanitary Staff died during the year :—

Messrs .T. A. Thompson and C. C. L. Blankson, 2nd Division Sanitary Inspectors.

Mr. W. B. Botchey, Storekeeper, was dismissed the Service as from the 13th of June, 1926, and his appointment was filled by Mr. C. B. Nettey.

ORDINANCES, ETC.

Ordinances, Rules and Orders affecting public health promulgated during the period under review included the following :—

1. Ordinance No. 26 of 1925, Births, Deaths and Burials Ordinance, came into force in the Colony proper and in Ashanti on the 1st of June, 1926, the Ashanti Cemeteries Ordinance of 1909 being repealed as from the date on which the new Ordinance came into force. This Ordinance was introduced to bring up to date the provisions contained in Ordinance No. 3 of 1912 relating to the subject of birth and death registration (as recommended by Sir William Simpson during his visit to the Colony in 1924) and, as far as possible, to secure uniformity in registration throughout the Gold Coast. Certain portions may necessitate revision at a later date.
2. Ordinance No. 12 of 1926, Towns Amendment, giving fuller powers with regard to houses and streets, the sale of fresh and chilled provisions, and defining overcrowding.
3. Ordinance No. 26 of 1926, which came into force on the 1st of January 1927, restricted the traffic in opium and other dangerous drugs in accordance with the Geneva Convention of February, 1925.
4. Ordinance No. 31 of 1926, amending Section 4 of the Infectious Diseases Ordinance in accordance with modern epidemiological practice and relating more particularly to orders and evacuations from infected areas.
5. Order by the Governor No. 5 of 1927, under the Mining Health Areas Ordinance, 1925, defining Mining Health Areas.
6. Ordinance No. 11 of 1927 (The Mining Health Areas Amendment Ordinance) which took effect from the 18th of March, 1927, amplified the meaning of nuisance to include dangerous or ruinous dwellings.
7. Ordinance No. 2 of 1927 (Ashanti Administration Further Amendment Ordinance) which came into force on the 1st of January, 1927, restricted the consumption of spirits by increasing the licence fees by one hundred per centum.
8. Various Orders-in-Council under the Towns Ordinance applying the provisions of the Ordinance to Achimota, Asamangkese, Akim Swedru. Similarly, rules of a like purport were applied to Sunyani and Goaso.
9. Various Orders by the Governor under the Quarantine and Infectious Diseases Ordinances declaring the following localities infected owing to an outbreak of infectious disease :—

Accra, Nsawam, Asamangkese, Suhum.
10. Rule No. 7 of 1927, making Rules for the market at Nsawam.
11. Rule (Miscellaneous) No. 2 of 1927 under the Towns Ordinance and the Town Councils Ordinance, consisting of Rules for Selwyn Market, Accra.
12. Rule (Miscellaneous) No. 3 of 1927, under the Towns Ordinance and Town Council Ordinance, consisting of Rules for Salaga Fresh Meat and Fish Market, Accra.

TABLE I.

(c)—FINANCIAL.

Estimated Expenditure for the year 1926-27.

(a) PERSONAL EMOLUMENTS.

MEDICAL.

							£
Administrative Officers	..	..	..	..	..	..	7,305
Specialists	..	..	..	..	..	..	6,099
Senior Medical Officers	..	..	..	..	..	..	7,280
Medical Officers (European and African)	..	..	..	..	..	..	40,227
Dental Surgeon	..	..	..	..	..	..	871
European Nursing Staff	..	..	..	..	..	..	7,122
African Nursing Staff and Dispensers	..	..	..	..	..	..	21,373
Clerical Staff	..	..	..	..	..	..	2,987
Various items, allowances, etc.	..	..	..	..	..	..	12,942
Total Personal Emoluments	..	..	..	..	..	..	£106,206

SANITATION.

							£
Administrative Officers	..	..	..	..	..	..	1,560
Senior Sanitary Officers and Medical Officers of Health	..	..	..	..	..	..	16,957
European Sanitary Inspectors	..	..	..	..	..	..	4,837
African Sanitary Inspectors	..	..	..	..	..	..	12,565
Various items, allowances, etc.	..	..	..	..	..	..	5,517
Total Personal Emoluments	..	..	..	..	..	..	£41,436

MEDICAL RESEARCH INSTITUTE.

							£
European Staff	..	..	..	..	..	..	8,908
African Staff	..	..	..	..	..	..	772
Total Personal Emoluments	..	..	..	..	..	..	£9,680

(b) OTHER CHARGES.

MEDICAL.

							5
Passages, Transport, etc.	..	..	..	..	..	..	12,450
Hospital Equipment, Drugs, Medical appliances, Surgical Instruments, etc.	..	..	..	..	..	..	20,680
Diets, Medical Comforts	..	..	..	..	..	..	9,900
Other items	..	..	..	..	..	..	6,890
Contributions	..	..	..	..	..	..	800
Extraordinary Expenditure.							
Ambulances	..	..	..	..	..	..	780
Hospital Equipment	..	..	..	..	..	..	2,730
Total	..	..	..	..	..	..	£54,230

SANITATION.

							£
Passages, Transport, etc.	..	..	..	..	..	..	7,357
General Sanitary Votes	..	..	..	..	..	..	18,461
Scavengers and Labourers	..	..	..	..	..	..	28,502
Total	..	..	..	..	..	..	£54,320

MEDICAL RESEARCH INSTITUTE.

							£
Passages, Transport, etc.	..	..	..	..	..	..	1,530
General Research Votes	..	..	..	..	..	..	1,532
Total	..	..	..	..	..	..	£3,062



THE UPPER PORTION OF THE INSUBEN KEY DRAIN AT
KUMASI ALMOST COMPLETED.



Estimated total expenditure, Medical Department—£268,934.

Revenue earned by Medical Department (Hospital Fees)—£5,556 16s. 10d.

The total estimated expenditure of £268,934 is equal to roughly 1-14th or 6.88 per cent of the estimated Revenue of the Colony, *viz.*, £3,907,520.

II.—PUBLIC HEALTH.

(a)—GENERAL REMARKS.

The following Table shews the most note-worthy contrasts in the Returns of Diseases treated during the years 1924-25, 1925-26 and the period under review :—

Disease.	1924-25.	1925-26.	1926-27.
Small-pox	19*	1,948	172
Varicella (Chicken-pox)	211	241	165
Dysentery :—	693	936	—
(a) Amoebic	—	—	515
(b) Bacillary	—	—	145
(c) Undefined or due to other causes.	—	—	180
Enteric Group :—	31	8	—
(a) Typhoid Fever	—	—	16
(b) Para-typhoid A.	—	—	15
(c) Para-typhoid B.	—	—	—
(d) Type not defined	—	—	53
Influenza	246	548	220
Malaria :—			
(a) Tertian	1,218	886	1,301
(b) Quartan	276	382	91
(c) Aestivo-autumnal	1,427	2,742	2,675
(d) Cachexia	1,108	657	675
(e) Blackwater	16	18	7
(f) Unclassified	1,171	1,893	1,687
Measles	22	32	44
Pneumonia :—	514	687	—
(a) Broncho-Pneumonia	—	—	257
(b) Lobar Pneumonia	—	—	447
(c) Unclassified	—	—	84
Trypanosomiasis (Sleeping Sickness)	26	37	67
Whooping Cough	35	107	102
Alcoholism	28	55	37
Yellow Fever	10	8	86
Tuberculosis :—	414	571	—
(a) Pulmonary and Laryngeal.	—	—	515
(b) Others	—	—	183
Plague :—	342	2	—
(a) Bubonic	—	—	—
(b) Pneumonic	—	—	—
(c) Septicaemic	—	—	—
(d) Undefined	—	—	—

* Refers only to cases treated in recognized Hospitals.

COMPARATIVE FIGURES FOR THREE YEARS 1924-25, 1925-26,
1926-27 FOR ALL PATIENTS.

	Remaining in Hospital.	Total cases treated In-and Out- patients).	Deaths.	Remaining over.
1924-25	519	82,476	797	467
1925-26	467	97,910	862	489
1926-27	489	105,300	700	626

There is little new to add to previous Annual Reports under the head of General Remarks. The total number of cases of all diseases treated by the Medical Branch shews a considerable increase on that of the previous year. The number of deaths has definitely diminished. Mosquito-borne diseases prevail everywhere during the rainy season and are the chief cause of ill-health.

One of the most serious features of the year under review was the yellow fever out-break at Asamangkese. An account of this is given under III, Hygiene and Sanitation.

During the Harmattan the native suffers considerably from chest complaints and pneumonia is common. It is gratifying to notice the drop in the number of blackwater fever cases from those of the previous year. Yaws, helminths, venereal diseases, etc., prevail the whole year round.

In the remarks given below the figures are taken from the returns of cases treated in Hospitals under the administration of the Medical Branch. In some cases the figures given under Hygiene and Sanitation may slightly differ. This is accounted for by the fact that the Sanitation Branch frequently treats cases in Contagious Diseases Hospitals, in temporary isolation camps, in villages, etc.

(I)—GENERAL DISEASES.

As implied in the above remarks general diseases are not a more common cause of ill-health on the Gold Coast than in temperate regions and therefore do not call for remark. Most of the ill-health is caused by communicable diseases.

(II).—COMMUNICABLE DISEASES.

(a) MOSQUITO OR INSECT-BORNE.

	1924-25.	1925-26.	1926-27.
<i>Malaria.</i>	5,216	6,574	6,444

Compared with the total cases of all diseases treated the incidence is practically the same from year to year.

Blackwater Fever.

Seven cases occurred, eleven less than the previous year. Five were Europeans and two were Syrians. Three deaths occurred, of which two were Syrians and one a European.

The record of the previous year shews that there were 13 cases in European with 5 deaths, 3 Syrians with 2 deaths and 2 Africans with no death.

Trypanosomiasis.

					In and Out-patients.	
					1925-26.	1926-27.
Cases	..	--	..	..	37	67
Deaths	..	--	..	..	5	11

The greater number of cases treated is probably due to the fact that the native is becoming more inclined to place faith in European methods and to come forward for treatment more willingly.

Yellow Fever.

The great increase in the figures for the year 1926-27 gives serious cause for anxiety. The remarks on yellow fever under III, Hygiene and Sanitation should be referred to.

Relapsing Fever

Small out-breaks took place at Accra, Akwatia, Keta, and Kumasi, during the year and are reported under III, Hygiene and Sanitation.

(b) INFECTIOUS DISEASES.

Smallpox.

The outbreak of 1925-26 has been steadily dying down. There has been a definite decrease from 1,948 cases in 1925-26 to 172 with 21 deaths (out-patients) in the period under review. The majority of cases occurred in the North-Eastern part of the Northern Territories and it is hoped that in the coming year the outbreak will come to an end.

Dysentery.

840 cases of all kinds were recorded, a decrease of 96 of the previous year. The amoebic form accounted for 515 of the total cases.

Influenza.

220 cases were recorded as compared with 548 during the preceding year. The disease was very mild. Amongst 84 in-patients no death occurred.

Pneumonia.

788 cases were recorded with 75 deaths. This gives a case mortality of 9½%. Incidence over last year was increased by 100 but case mortality was less by about 3%.

Tuberculosis.

During the year a total of 698 cases were treated with 92 deaths. This unfortunately shews a steady increase. Compare 1925-26 with 571 cases and 76 deaths and 1924-25 with 414 cases and 51 deaths.

A scheme for the addition of a special tuberculosis block to the Gold Coast Hospital was under consideration but it was not found possible to give effect to it during the year

Wards for treatment were, however, added during the year to the African Hospital at Kumasi. The tuberculosis problem is undoubtedly a growing one especially in connection with labour in the mining centres. Schemes for the improvement of housing and a large Sanatorium for the isolation and treatment of sufferers will have to be considered in the near future.

Venereal Diseases.

The figures for the previous year for the whole Colony for the three chief venereal diseases as compared with the year under review are as follows :—

					Gonorrhoea.	Syphilis.	Chancroid.
1925-26	..	..	..	..	3,359	2,220	413
1926-27	..	..	..	..	3,769	1,277	246

(A report on the new Venereal Clinic in Accra will be found under Heading VI).

Leprosy.—During the year under review 668 cases were treated with one death. This is an increase on the 446 cases of the previous year and the 96 of 1924-25. The increase in numbers is due to the efforts being made to collect patients for treatment, furthermore there is no doubt that the hope of relief which has been raised by observing the excellent effects of injections in yaws and other diseases has induced patients to come for treatment. The actual incidence of the disease is not accurately known and is difficult to estimate but so far proof has not been obtained that it is

increasing. Towards the end of September, 1926, the Medical Officer of Ho started a temporary Leper Settlement at Dome near the town of Ho in British Mandated Territory, Togoland. Admissions at first were slow but by the end of the year he had 33 cases and more applicants still wanting admission. It has been decided to acquire, in the coming year, a site about $1\frac{1}{4}$ miles outside of Ho as a permanent Settlement for 100 lepers. In the working of the Settlement considerable information is sure to be gained which will be of great use as a guide to the formation of Settlements in other parts of the Colony.

(c) HELMINTHIC DISEASES.

Ankylostomiasis.

184 cases (In and Out-patients) with 7 deaths were treated in 1925-26. In the year under review there were 421 cases with no death. Infestation with hook-worm is common in all parts but does not seem to cause much disability except in the hot sandy shaded area along the sea coast in the Axim District where serious cases with intense anaemia are often met with.

VITAL STATISTICS.

(I)—GENERAL NATIVE POPULATION.—

1. The census of 1911 gave the resident African population of the Gold Coast as 1,502,286 while the last census taken in 1921 gave a figure of 2,108,461, the Mandated Areas not being included. The population on the 1st October, 1926, this being midyear according to the custom of yearly periods commencing on the 1st April, would thus appear to be approximately 2,628,284 by logarithmic calculation.

The total number of births registered for 1926-27 was 5,160, but even in districts where registration was in force only a small proportion of births were registered except, possibly in the larger centres where the means of enforcing registration were greater.

2. Thus owing to insufficiency of data it is not practicable to calculate birth rates except in respect of towns where registration has been in progress over a considerable number of years. The total number of deaths registered for 1926-27 was 4,815. Here again these figures are incomplete for death registration is not in force in many rural areas. On the other hand, since deaths are less easy to conceal than births, death registration is much more complete in the larger centres than birth registration.

3. In addition to being incomplete as regards registration, the actual causes of deaths are very inaccurate. In the smaller areas where deputy registrars are laymen the favourite causes of death returned include "piles", "fever" "bellyache" "colic". In one instance a young man of twenty-nine years of age was alleged to have died of whooping cough after being ill for five months. In the larger centres a proportion of the deaths are registered as "cause unknown" owing to the prevailing interpretation of some of the provision of the new Ordinance regulating births, deaths and burials.

4. In considering the above figures it should be borne in mind that registration was extended to a large number of small centres on the coming into force of the amended Births, Deaths and Burials Ordinance No. 26 of 1925, on the 1st of June, 1926. Thus, figures for the period under review could not fairly be compared with those of previous years.

5. It is not possible to determine the infant mortality rate for the whole Colony owing to the fact that infant births not infrequently remain unregistered even in large centres while in smaller areas infant deaths may escape observation. The following table gives details of births and deaths in the six more important towns in the Gold Coast :—

Town.	Deaths.				Births.				Infant Mortality Rate.			
	1923-24	1924-25	1925-26	1926-27	1923-24	1924-25	1925-26	1926-27	1923-24	1924-25	1925-26	1926-27
Accra	1,018	986	1,207	1,130	1,011	1,000	1,082	2,095	264	203	258	124
Kumasi	398	498	428	436	26	439	581	550	—	77	77	110
Cape Coast	314	283	341	315	218	315	219	306	146	82	123	124
Sekondi	382	437	309	375	178	160	150	242	123	112	173	61
Kofofidua	179	231	238	239	74	51	39	173	391	647	769	196
Tarkwa	171	134	125	190	74	50	29	72	148	240	172	152

II. GENERAL EUROPEAN POPULATION.

	1925-26.	1926-27.
(i) Government Officials	994	1,046
(ii) Employees of Trading Firms	1,529	1,861
(iii) Employees of Mining Companies	469	440
(iv) Missionaries	112	134
Total	3,104	3,481

An increase of 52 Government officials and 325 non-officials over the previous year took place. The chief increase was in the mercantile community.

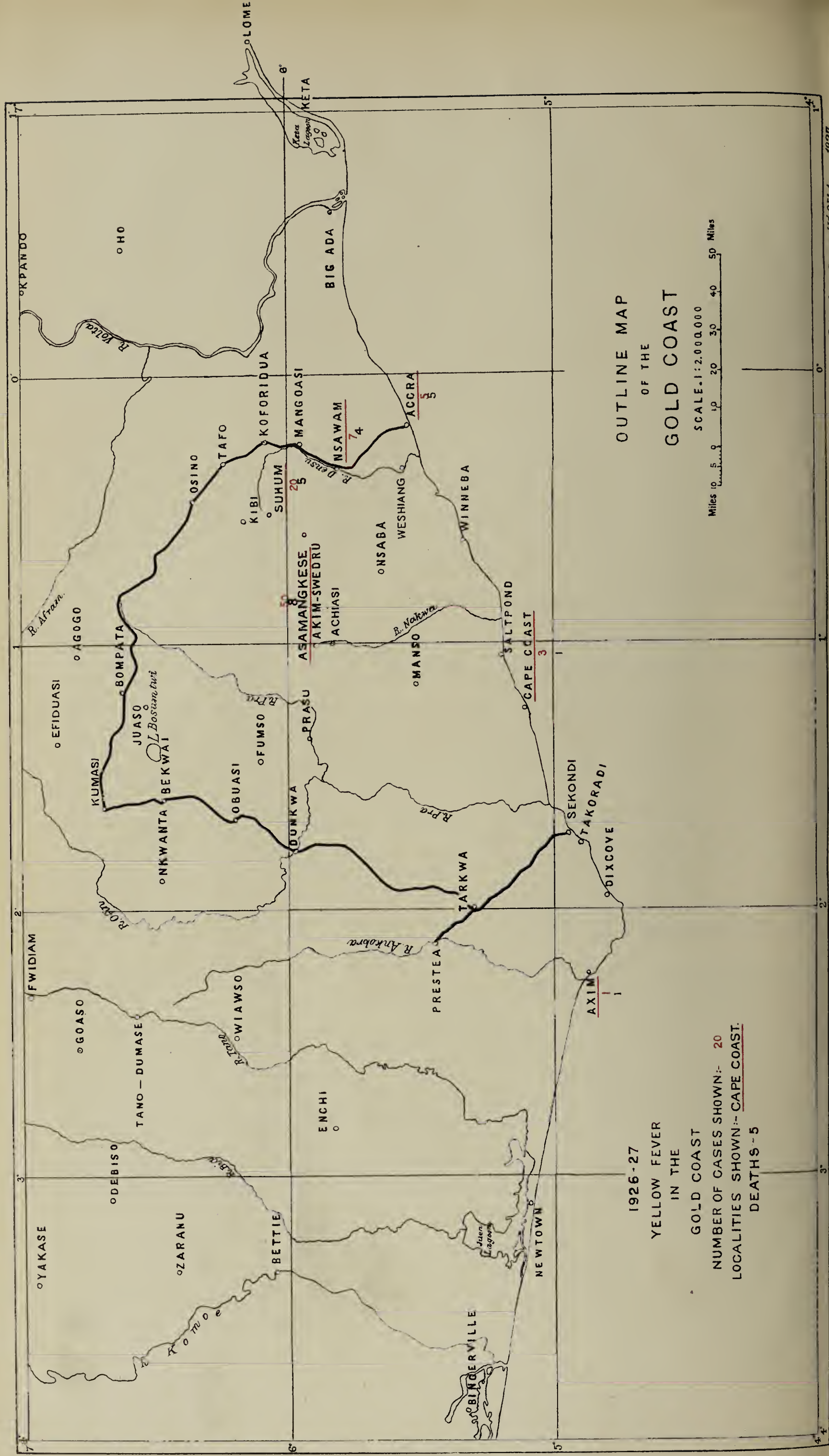
III. EUROPEAN OFFICIALS.

TABLE SHEWING SICK, INVALIDING AND DEATH RATES.

	1924-25.	1925-26.	1926-27.
Total number of Officials resident	846	994	1,046
Average number resident	680	761	783
Total number on the Sick List	888	781	795
Total number of days on Sick List	8,614	6,108	6,847
Average daily number on Sick List	23.6	16.7	18.75
Percentage of sick to average number resident	3.47	2.19	2.39
Average number of days on Sick List for each patient	9.70	7.82	8.61
Average sick time to each resident	12.66	8.02	8.74
Total number invalided	58	59	49
Percentage of invalidings to total residents ..	6.85	5.93	4.68
Total deaths	7	8	3
Percentage of deaths to total residents ..	0.82	0.80	0.28
Percentage of deaths to average number residents	1.02	1.05	0.38
Number of cases of sickness contracted away from residence	—	—	Not available.

NUMBER OF DAYS ON SICK LIST.

	1924-25.	1925-26.	1926-27.
Tropical Diseases	3,808	2,410	2,734
Non-tropical Diseases	4,806	3,698	4,113
Totals	8,614	6,108	6,847



Causes of Invaliding of European Officials.

Blackwater fever 2, yellow fever 1, malaria 3, alcoholism 2, debility and anæmia 9, insomnia 3, continued fever 1, dysentery 1, remittent fever 1, furunculosis 1, asthma 1, polyarthrititis 1, pleurisy 1, epilepsy 1, peritonitis 1, orchitis 1, neurasthenia 2, gastric ulcer 1, gastric pains 1, delusional insanity 1, adenitis 1, gonorrhoeal arthritis 1, injuries to head 1, gastro-enteritis 1, nervous exhaustion 1, duodenal ulcer 1, phosphaturia 1, tonsillitis 1, headache 1, synovitis 1, compound fracture of leg 1, painful stump after amputation of leg 1, fracture of skull 2, total 49.

Of the 49 officials invalided only one was military.

CAUSES OF DEATHS OF EUROPEAN OFFICIALS.

Yellow fever 1, blackwater fever 1, pneumonia 1, total 3.

EUROPEAN OFFICIALS—INVALIDINGS.

ANALYSIS OF RESIDENTIAL SERVICE.

Serving under	Residential Service.						Total.
	Under Six months.	6 but under 9.	9 but under 12.	12 but under 15.	15 but under 18.	18 months and over.	
Old leave Regulations ..	—	1	1	4	—	—	6
New Leave Regulations ..	4	8	4	12	13	2	43
Total							49

Invaliding Rate per 1,000.

1924-25	..	..	..	..	..	..	68.55
1925-26	..	..	..	..	..	..	59.35
1926-27	..	..	..	..	..	..	46.84

Death Rate per 1,000.

1924-25	..	..	..	..	..	..	8.29
1925-26	..	..	..	..	..	..	8.04
1926-27	..	..	..	..	..	..	2.87

From the above it will be seen that definite improvement has taken place in the past three years.

EUROPEAN MORTALITY AND INVALIDING RATES FOR THE YEAR.

	No.	Deaths.	Invalidings.	Death Rate per 1,000.	Invaliding Rate per 1,000.
Officials ..	1,046	3	49	2.87	46.84
Non-officials	2,435	23	65	9.40	26.69

This Table shews that the Death-Rate amongst Non-officials was much higher than amongst Officials whereas the Invaliding-Rate was higher amongst officials.

The high Death-Rate amongst Non-officials for the year is due largely to the heavier incidence of malaria and its complication (blackwater fever). Yellow fever accounted for 4 deaths.

EUROPEAN NON-OFFICIALS.

TABLE SHEWING INVALIDING AND DEATH RATES.

1924-25.	No.	Deaths.	Invalided.	Death Rate per cent.	Invaliding Rate per cent.
Merchants	1,482	11	42	0.74	2.83
Mining Companies	434	1	16	0.23	3.68
Missionaries	104	—	8	—	7.69
Totals	2,020	12	66	0.59	3.26
1925-26.					
Merchants	1,529	10	36	0.65	2.35
Mining Companies	469	3	23	0.63	4.90
Missionaries	112	1	7	0.89	6.25
Totals	2,110	14	66	0.66	3.12
1926-27.					
Merchants	1,861	13	49	0.69	2.63
Mining Companies	440	5	15	1.13	3.40
Missionaries	134	5	1	3.73	0.74
Totals ..	2,435	23	65	0.94	2.66

Causes of Invalidings of Non-official Europeans.

Paratyphoid fever 2, neurasthenia 3, chronic malaria 3, baccilluria 1, pulmonary tuberculosis 2, typhoid fever 3, alcoholism 3, anaemia 1, poisoning (suicide) 1, internal haemorrhoids 1, syphilis 2, peripheral neuritis 1, cardiac dilatation 1, fracture (tibia) 1, prostatic abscess 1, blackwater fever 4, religious mania 1, debility 1, insomnia 1, melancholia 2, idiosyncrasy to quinine 1, subtertian malaria 1, unclassified malaria 1, P. U. O. 1, dysentery (type not defined) 2, arthritis 1, gastric ulcer 1, heart strain 1, pyaemia 1, appendicitis 1, malaria 2, climatic bubo 1, yellow fever 1, cystitis 1, tuberculosis (kidney) 1, malignant stricture of oesophagus 1, pleurisy 1, colitis 1, corneal ulcer 1, arteriosclerosis 1, otitis media (malaria) 1, silicosis 2, ulcer varicose (leg) 1, venereal disease 1, tubercle of lung 1, malaria, (femoral adenitis) 1, old age 1, total 65.

Causes of Deaths of Non-official Europeans.

Yellow fever 4, blackwater fever 3, cerebral malaria 4, pelvic injuries 1, shock and hæmorrhage from injuries (accident) 1, typhoid fever 1, malignant, malaria 1, self-inflicted wound of neck 1, hæmorrhage 1, syncope 1, cerebral toxæmia from amoebic dysentery 1, old age 1, unclassified fever 3, total 23.

IV.—AFRICAN OFFICIALS.

TABLE SHEWING SICK, INVALIDING AND DEATH RATES.

	1924-25.	1925-26.	1926-27.
Total number of Officials resident	2,912	2,881	3,512
Average number resident	2,805	2,723	3,382
Total number on the Sick List	753	888	771
Total number of days on Sick List	9,170	8,967	8,492
Average daily number on Sick List	25.12	24.56	23.26
Percentage of Sick to average number resident	0.86	0.89	0.68
Average number of days on sick list for each patient	12.17	10.09	11.01
Average sick time to each resident	3.26	3.29	2.51
Total number invalided	20	18	29
Percentage of invalidings to total residents ..	0.68	0.62	0.82
Total deaths	27	28	22
Percentage of deaths to total residents ..	0.92	0.97	0.62
Percentage of deaths to average number resident	0.96	1.02	0.65
Number of cases of sickness contracted away from residence	—	—	Not available.

Causes of Invaliding of African Officials.

Pulmonary tuberculosis 6, heart disease 8, cerebral degeneration 3, defective vision 3, tubercular laryngitis 1, general tuberculosis 1, neurasthenia 1, pulmonary congestion 1, psychoneurosis 1, aortic aneurysm 1, posterior synechia 1, cephalitis 1, hemiplegia 1, total 29.

Causes of Deaths of African Officials.

Yellow fever 1, pulmonary tuberculosis 6, broncho-pneumonia 4, septicaemia 3, heart failure 2, cerebral hæmorrhage 2, myocarditis 1, malarial cachexia 1, gastro-enteritis 1, nephritis 1 total 22.

III.—HYGIENE AND SANITATION.

A —GENERAL REVIEW OF WORK DONE AND PROGRESS MADE.

(i) MOSQUITO AND INSECT-BORNE DISEASES.

Malaria.

Drainage and reclamation of lagoons and swamps, the filling of ponds and borrow pits, the laying of " Dutch " drains in connection with seepage areas, the construction of concrete drainage systems, the treatment of low-lying areas incapable of being economically drained or filled by oiling or by treating with copper aceto-arsenite, the inspection of school children, the distribution of quinine at hospitals and clinics, the encouragement of segregation, of the use of nets, of mosquito proofed premises and of prophylactic quinine by non-immunes, the enforcement of rules relating to residential areas, the educative propaganda by means of Health Weeks and public lectures and hygiene lessons in schools, form but a few of the methods by which the incidence of malaria is attacked. The results of the examination of school children at Accra and Sekondi by the lady Medical Officers and at Kumasi, Cape Coast and Koforidua by the Medical Officers of Health are tabulated below.

TABLE I.

Town.	No. examined.	No. found in enlarged spleens.	Percentage of enlarged spleens.
Accra	576	111	21.6
Kumasi	1,859	578	30.0
Sekondi	941	358	38.0
Cape Coast	518	163	31.46
Koforidua	715	571	79.8



THE INSUBEN KEY DRAIN AT KUMASI ALMOST COMPLETED.



Yellow Fever.

The Gold Coast Colony suffered severely from the incidence of yellow fever during the year under review. The tables given clearly demonstrate both the increased incidence as compared with previous years and the widespread distribution of cases during the period covered by this report.

TABLE II.—CASES AND DEATHS FROM 1910 TO 1926-27.

Year.	Accra.		Remainder of Colony.		Total for Gold Coast.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1910 ..	—	—	15	14	15	14
1911 ..	8	4	1	1	9	5
1912 ..	3	2	7	1	10	3
1913 ..	10	1	10	6	20	7
1914 ..	2	2	17	7	19	9
1915 ..	—	—	2	2	2	2
1916 ..	—	—	6	5	6	5
1917 ..	2	2	3	3	5	5
1918 ..	—	—	4	1	4	1
1919 ..	—	—	11	7	11	7
1920 ..	1	1	1	—	2	1
1921 ..	2	2	2	2	4	4
Jan. 1922 } Mar. 1923 }	5	5	18	10	23	15
1923-24 ..	—	—	13	11	13	11
1924-25 ..	—	—	10	7	10	7
1925-26 ..	4	2	4	3	8	5
1926-27. ..	5	5	81	19	86	24

TABLE III.—CASES AND DEATHS, 1926-27.

Town.	Europeans.		Syrians.		Africans.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Accra ..	2	2	1	1	2	2
Cape Coast	2	—	1	1	—	—
Nsawam ..	3	2	—	—	4	2
Suhum* ..	—	—	—	—	20	5
Asamangkese	—	—	—	—	50	8
Axim† ..	1	1	—	—	—	—
Totals.	8	5	2	2	76	17

*One case escaped and died at Nkatago north-west of Kumasi.

†Ex s.s. *Murmattan* ex Dakar.

It will be observed that the disease which hitherto in this country had appeared to have a greater incidence on so-called non-immunes or individuals of the white race affected Africans in a much greater degree during the year.

The explanation is hard to find but it is suggested that, either as the result of comparative immunity from epidemics for a considerable period a relatively non-immune race of Africans has come into being, or that epidemics, which in the past went unrecognised either through faulty death registration or from the remote-

ness of towns and villages from medical aid, now are discovered owing to improved death registration, to the very considerable improvement in lines of communication and means of transport which allow of rapid transit to areas hitherto untraversed, and to the increased medical and sanitary personnel stationed in various parts of the Colony.

That epidemics within fifty miles of Accra involving serious loss of life do still remain undetected for considerable periods owing to the dearth of Health Officers is clearly established by the history of the outbreak of yellow fever at Asamangkese in 1926. Briefly, Asamangkese is an important cocoa centre situated about forty miles as the crow flies north-west of Accra.

The population consists of about 4,800 African inhabitants living in about 800 compounds. The water supply is derived from a small stream, from shallow wells and from rain water barrels.

The town is connected by a good motor road about thirty-miles in length with Nsawam, an important town lying to the southeast on the main Accra-Saltpond-Cape Coast-Sekondi Road.

Outbreaks of yellow fever involving two deaths in Europeans and several non-fatal cases occurred towards the end of March, 1926, in Nsawam.

Other outbreaks were reported in May in Cape Coast and Saltpond.

From the information subsequently received, it would appear that the disease was introduced into Asamangkese in May and that it was causing many deaths before the end of that month.

In spite of this, however, the epidemic was not discovered until towards the end of July, when twenty-eight cases were seen. In the following month a further twenty cases occurred and the outbreak virtually came to an end in September, during which month only two cases were reported. The following table prepared by Dr. W. G. Watt shows the age and sex distribution and mortality among the fifty cases actually observed.

TABLE IV —CASES AT ASAMANGKESE

Age.	0-5 Yrs.		5-15 Yrs.		15-20 Yrs.		20-45 Yrs.		45 Yrs. and over		Total.
Type of case.	Male.	Female	Male.	Female	Male.	Female	Male.	Female	Male.	Female	
Fatal Cases	Nil	Nil	Nil	Nil	2	Nil	3	2	1	Nil	8
Severe Cases	Nil	Nil	2	1	2	Nil	6	3	—	—	14
Moderately severe cases	Nil	Nil	1	2	4	1	5	1	—	—	14
Mild Cases	Nil	Nil	6	1	1	—	2	3	—	1	14
Totals	—	—	9	4	9	1	16	9	1	1	50

The members of the Rockefeller Commission who carried out very careful and comprehensive investigations with regard to this outbreak were of the opinion that over a thousand cases or twenty-five per centum of the total population of the town suffered from the disease between May and September. This was based upon a mortality of sixteen per centum in the fifty cases studied and from reliable information including a statement that eight out of a total of fourteen persons living in one compound had died of the disease.

The case mortality of fifty per centum in persons over thirty years of age suggested very strongly that many mild and probably unrecognised cases of yellow fever occur in children—a hypothesis of many years standing. It is interesting to note that the larval (*Aedes argenteus*) index in Asamangkese at the end of July was found to be eighty-five while it was brought down below five by intensive anti-larval measures by the 3rd of September. The correspondingly rapid fall in the number of cases of yellow fever reported constitutes useful negative evidence as to the vector.

Several members of the Rockefeller Commission took part in the investigation of the outbreaks.

No fresh information has yet been elicited and, although doubt has been cast on *Aedes argenteus* being the vector, it is noteworthy that efforts made to reduce the larval index below five have usually been successful in bringing outbreaks to an end. The *Leptospira icteroides* of Noguchi was not found in any of the cases whether examined before death or at an autopsy. It is a matter of great regret that one of the Medical Officers of Health, Dr. Ranking, died of the disease whilst combating the outbreak at Nsawam.

Routine measures against the disease included regular house-to-house inspections followed by prosecutions where warnings were disregarded, the screening of tanks, wells, barrels and other water receptacles, the prevention of stagnant water in eaves guttering, sullage pits, tins, bottles, refuse, flower vases, meat-safes, ice-chests, holes in trees—especially the flamboyant—the removal of water-bearing plants, e.g. bamboo, plantain, pine-apple, coco-yam and sisal, the inoculation of non-immunes with Noguchi's vaccine, the segregation as far as possible of non-immunes, the isolation under a net of suspected and actual cases, the surveillance of contacts, the disinfection of premises and areas in which cases of yellow fever had occurred, the education of the community by lectures, warning notices, and prosecutions.

The outstanding fact that the large majority of deaths from yellow fever in non-immunes continues to occur in those who do not reside in segregation areas constitutes a complete vindication of the policy of segregation and should serve as a lesson to those who cast doubt on the value of residential areas for the different races in this Colony. The deaths from yellow fever and haemoglobinuric fevers that occur year after year amongst persons who live in close proximity to the African population should serve as an adequate and timely lesson.

In this connection it is hoped that the commercial interests in Europe may be impressed with the vital importance of securing accommodation for their employees in residential areas set apart by the Government for the purpose.

The inconvenience and discomfort that results when individuals are compelled to leave an area in an African township owing to the prevalence of yellow fever or other dangerous infectious disease in that area scarcely need emphasising.

Trypanosomiasis.

Unlike in East Africa this disease is not commonly met with in man on the Gold Coast and the vital statistics for the period under review only give it as the cause of death in eleven cases. Deaths from the disease in dogs, cattle, and horses are on the other hand of frequent occurrence.

Preventive measures included the clearing of bush round villages, water supplies and fords, the planting of dhub grass—a large acreage has been planted at Sunyani Krachi, and else where—the removal of certain varieties of palm trees from the vicinity of houses—the Medical Officer, Tarkwa, removed over three thousand trees from the Tarkwa Residential Area—and the treatment of cases of the disease. The Medical Officer at Kintampo reported good results from the use of Germanin.

Filariasis.

This disease is met with in small numbers throughout the Colony but is perhaps more common among the Northern Territory tribes where filarial swellings and abscesses are often encountered. Preventive methods against the disease are the same as those directed against other mosquito and fly-borne ailments.

(ii) EPIDEMIC DISEASES.

Plague.

No cases of plague were notified during the year.

Anti-plague measures consisted of systematic rat destruction—some 74,126 rats being captured and killed in seven of the more important stations. No rats were found to be infected with *b. pestis*.

The rat-proofing of houses and stores was encouraged and legal proceedings were instituted against those who failed to rid their premises of vermin. The construction of dwellings with bamboo or with mud and wattle was prohibited as much as possible owing to the fact that dwellings constructed of these materials almost invariably harbour colonies of rats and mice.

Smallpox.

In all one-hundred and seventy-two cases of the disease with twenty-one deaths occurred of which one-hundred and five cases and six deaths were reported from the Northern Territories. With the exception of the Northern Territories where scattered outbreaks of a mild type continued to occur, the Colony was free from any serious epidemic of smallpox during the year. Isolation of cases, disinfection of dwellings, vaccination and surveillance of direct and indirect contacts, and general vaccination comprised the preventive measures against the disease. Vaccinations were performed in the larger centres of the population and in areas where cases of smallpox occurred. Some eleven assistant public vaccinators were employed, lanolated lymph from the Lister Institute being used.

	1923-24.	1924-25.	1925-26.	1926-27.
Vaccinations performed ..	82,425	102,546	311,927	243,675
Vaccinations verified successful ..	36,468	45,163	98,869	135,837
Percentage verified successful ..	44.24	44.04	31.69	55.78

Cholera.

This disease is fortunately still unknown on the Gold Coast in spite of the fact that possible cholera carriers in the form of Indians and Syrians appear to be coming to the Colony in increasing numbers and that water and food-supplies in certain localities are liable to gross contamination.

Precautionary measures included the protection of water supplies where possible the supervision of the disposal of night soil and refuse, the improvement of conditions under which food is sold in the larger centres of population, and general anti-fly measures.

Dysentery.

This disease was unfortunately widespread throughout the Gold Coast as may be seen from the following :—

TABLE V.

	Amoebic.		Bacillary.		Unclassified.	
	Cases.	Deaths..	Cases.	Deaths.	Cases.	Deaths.
Colony	116	15	97	8	64	3
Ashanti	46	4	5	—	6	—
Northern Territories ..	9	1	20	2	23	6
Total	171	20	122	10	93	9

It is significant that inflammatory conditions of the bowel in children who attended as out-patients at the Child Welfare Clinic at Accra where the water supply is excellent and where there is an organised system for the removal of nightsoil and refuse—occurred in one-thousand and seventy-seven or eighteen per centum.

The low standard of personal hygiene as regards the preparation of food rather than the question of polluted water has been suggested in the case of the prevalence in such towns as Accra though it would appear to be impossible to exclude the possibility of fly infection from public latrines.

There can be no doubt that, if not the actual cause, the unsatisfactory and highly contaminated sources of water supply in many localities, more especially in the Northern Territories, constitutes a contributory cause of the high incidence of bowel diseases on the Gold Coast.

Enteric Fever.

Thirty-one cases were reported as in-patients in the various centres with four deaths.

Preventive measures against the disease have been dealt with under other heads. Inoculation with mixed anti-typhoid vaccine was offered to anyone desiring to secure better protection.

Relapsing Fever.

Fifty-two cases with four deaths were reported from Accra, Nsawam, Akwatia, Keta and Kumasi during the year.

Exactly four years after the disease had first been recognised on the Gold Coast—during the epidemic in Accra in 1923—a serious outbreak occurred in Kumasi on the 1st of March, 1927. By the end of the month thirty-one cases had occurred two of which were fatal.

In every case the patient was a male and had come from Gawo, Dori or neighbouring towns in French Senegal and Niger Territory. As in the Accra outbreak the majority of the cases were Zabramahs.

The vector was conclusively proved to be the louse, the infecting organism being *Sp. obermeireri*. The danger attending such epidemics is small if the cases can be brought under treatment at an early stage of the disease but the similarity of the clinical signs and symptoms to those met with in cases of yellow fever and the high mortality in untreated cases make it necessary to take every step to limit such outbreaks.

It is matter of gratification that, probably as the result of the activities of the Health Section of the League of Nations, the liaison between this Colony and neighbouring administrations in matters affecting public health has improved out of all knowledge in the past year or so. In this particular case, notifications of outbreaks of relapsing fever in the French Senegal and Niger Territory have been frequently reported by the Governor-General of French West Africa.

From such reports it would appear that a virulent strain of relapsing fever is endemic in French territory to the North of the Northern Territories.

For example, in October, 1926, out of fifty cases of relapsing fever fifteen are reported to have died. In another group of cases twenty-one deaths occurred in forty-six cases—a case mortality of over forty-five per centum.

This compares with a case mortality rate of 7.6 per centum in the 52 cases reported as having occurred in the Gold Coast in 1926-27.

Preventive measures against the disease included the improvement in sanitary conditions in general and in the circumscribing as far as possible of local foci of infection by the treatment of all cases in hospital, the disinfestation of cases and direct and indirect contacts, of clothing and of houses. It was not difficult to persuade groups of labourers among whom the disease occurred to submit to general disinfestation including the complete shaving of hair from head, pubes and axillae.

Anthrax.

Cases of this disease all of which were fatal to the number of six were reported from the following stations during the year :—Kumasi four, Kintampo one, Salaga one. Infection in the Kumasi and Kintampo series was believed to have resulted from the consumption of diseased meat while the source in the Salaga case was thought to have been an infected hide.

The inspection of cattle prior to slaughter and disposal of the bodies of diseased animals by deep burial and care in the limitation of cases after the occurrence in humans by disinfection with formalin, etc., were among the preventive measures used.

Cerebro-spinal Meningitis.

Happily, there has been no serious outbreak of this disease since the epidemic in Ashanti and the Northern Territories in 1920.

A total of three cases with two deaths were notified from the following localities:—Cape Coast, Sekondi and Accra.

Prevention was aimed at through the improvement of housing conditions and by obviating overcrowding as far as possible.

In the larger centres of population the idea of the open window is gradually acquiring willing disciples.

The enthusiasm evinced by many of the chiefs and people of Ashanti for new layouts for their somewhat primitive villages was most gratifying. It was well known to the chiefs and their people that layouts involved the prior provision on the site by the people themselves of adequate latrine accommodation and of incinerators, that the Health Authorities also required a higher standard of building construction and that layout in existing towns and villages—as apart from those on new sites—generally involved the sacrifice by the villagers of a certain number of less sanitary houses to enable roads and open spaces to be set out.

With the awakening of sanitary conscience and a desire for the improvement of towns and villages, the demands for skilled assistance from Health Authorities were sometimes greater than the means at present available for meeting them.

The Senior Sanitary Officer, Ashanti, in his report for 1926-27 made the following recommendations:—

“ 5. That the staff of Village Overseers should be increased. Many demands from the people of Ashanti themselves to have their villages sanitated and laid out cannot be met at present owing to shortage of staff. ”

Leprosy.

It is hoped that the compulsory segregation of all infective lepers in farm colonies with adequate arrangements for medical treatment will be introduced before long. At present the preventive measures against this disease leave much to be desired and consist mainly of endeavouring to persuade lepers to live in separate rooms and to utilise separate eating utensils.

The Medical Officer of Health, Accra, in his Annual Report for 1926-27 stated as follows:—

“ During the year an average of 40 lepers were under treatment at the Contagious Diseases Hospital. It cannot be said that Chaulmoogra oil is proving of much benefit. ”

Four lepers were treated in the Contagious Diseases Hospital at Kumasi during the same period.

A third centre was established at Ho in Mandated Territory.

Tuberculosis.

The number of deaths from tuberculosis continues to increase in spite of the improvement in housing conditions in many of the larger areas.

In Accra, for example, the number of deaths from the disease had risen from forty-four in 1918 when compulsory notification was first introduced to ninety-one in 1926-27, although it is no longer incumbent upon private Medical Practitioners to register cases of the disease. The population of Accra has increased considerably but not by any means proportionately to the same extent.

The Medical Officer, Tarkwa, in his report for 1926-27 states that pulmonary tuberculosis is the chief fatal disease in that town. This statement is substantiated by the fact that seventy-five or 39.4 per centum of those who died suffered from pulmonary tuberculosis. Of the deaths from this disease forty-nine or 65.3 per centum occurred in employees of the mines.

This is a serious state of affairs and would seem to point to the necessity of early action being taken to improve housing conditions and other factors affecting the health of the mine labourers and of the local population.

The Medical Officer of Health, Kumasi, reporting on pulmonary tuberculosis made the following statement in his annual report for 1926-27:—

“ This continues to be a serious menace to the public health owing to the almost complete absence of immunity among the African population resulting in a heavy case mortality rate amounting, according to the writer's observations, to nearly one hundred per centum.

“ The deaths from this disease numbered twenty-seven and formed over six per centum of the number of deaths registered. In addition to this there were a further eight deaths from tuberculosis.

“ Preventive measures included the voluntary isolation and treatment of ‘ open ’ cases—by far the greater proportion of the total cases—the examination of persons who had come in close contact with patients, and general hygienic measures directed towards the improvement of housing not only as regards individual houses but in the form of layouts, ventilation and drainage.

“ The lack of immunity and the consequent low powers of resistance to tuberculous infection possessed by West Africans has been pointed out again and again.

“ The menace of this “ white plague ” is not fully realised and unless adequate steps are taken to control it the results may one day be disastrous to the prosperity of the Colony. ”

Yaws.

This disease while being among the commonest ailments in the Gold Coast Colony, particularly in the first two decades of life, has undoubtedly been the means of popularising treatment by qualified practitioners owing to the almost miraculous disappearance of the cutaneous lesions associated with the disease as the result of a single injection of organic arsenical compounds, *e.g.* Novarsenobillon and, latterly, of the sodium bismuth tartrate mixture. Sufficient time has now elapsed since the introduction of the bismuth compound—a grain of which costs but a fraction of a penny—for its therapeutic value to be proved.

Proof was not obtained without difficulty for sufferers from the disease were not readily persuaded to undergo an adequate course of the drug since the cutaneous lesions frequently disappeared after one injection.

By persuading patients to remain in hospital for six weeks or more and to return for observation at intervals of four weeks it was clearly established that the majority of cases of primary and secondary yaws could be permanently relieved of the condition though a small per centage appeared to be refractory as is found to be the case in using organic arsenical compounds.

Objections have been levelled against the use of the bismuth mixture on the grounds that its use is attended by considerable pain at the site of injection and by the production of stomatitis.

At Kumasi a series of two hundred and thirty-eight cases of yaws made up of one hundred and seventy adults and sixty-eight children suffering from primary and secondary lesions, *clavus* and *gangosa* were treated with doses of one to four grains weekly or fortnightly until a total of six to twenty grains (according to age and condition) had been given. Pain was complained of in but few cases and then for four or five days only.

The pain, moreover, was not sufficient to prevent the patient returning for further treatment.

The local discomfort reacted readily to fomentations and hot sitz baths, and to lengthening the interval between doses.

Local necrosis occurred at the site of injection in two children and in one an abscess appeared but rapidly cleared up. In the last case the treatment had been hastened rather unduly as the child's mother was anxious to return to her village.

Stomatitis occurred in a woman of 65 after two doses each of two grains and in a boy of eight after a single dose of two grains. In both cases there were carious teeth and both recovered after the exhibition of sodium thiosulphate given intravenously on alternate days in addition to local treatment.

The conclusions arrived at were as follows :—

(1) Sodium bismuth tartrate is efficacious in most cases of primary and secondary yaws and in many cases of tertiary yaws when given in doses of six to twenty grains distributed over a period of three to ten weeks according to the nature of the lesion and to the age and condition of the patient.

(2) Pain at the site of injection can be reduced by avoiding large single injections and by ensuring that the course of treatment is spread over a sufficiently long period to allow of any local reaction subsiding before a second injection is given.

(3) Stomatitis can be prevented by giving small doses over a period, by inspecting teeth and gums prior to giving treatment to secure a "clean" mouth and by personally supervising the cleansing of teeth, gums and mouth with Glycothymoline or a solution of potassium permanganate of two grains to the pint during the course of the treatment.

Little difficulty was experienced in inducing patients or their parents to see that mouths were washed carefully after every meal and all debris removed. Stomatitis readily responds to the exhibition of sodium-thiosulphate and local treatment.

(4) Sodium bismuth tartrate is very inexpensive so that thousands of sufferers from a disease which though rarely fatal is frequently crippling and the cause of much suffering, can be relieved and, possibly, cured at a negligible cost to the Government.

The preventive measures taken against the disease include the treatment in Government hospitals and dispensaries of cases and general measures against fly-breeding and insanitary conditions.

(iii) HELMINTHIC DISEASES.

Ankylostomiasis.

This disease did not appear to be an important cause of death in 1926-1927 although the debilitating effects of infection with ankylostomes is undoubtedly a contributory factor in the death rate.

Preventive methods were directed towards the provision of adequate satisfactory latrine accommodation including that in mines, to the prosecution of persons indulging in promiscuous fouling, and to the treatment of cases of the disease.

Twenty-six such cases received treatment in Sekondi alone. The responsibility of chiefs and headmen in the smaller towns in the Gold Coast, Ashanti and Northern Territories for the provision of latrines was insufficiently appreciated. Even in areas where latrines were made for men, there was frequent neglect in the provision of latrines for women and children.

Tæniasis.

In his Annual Report for 1926-1927 the Medical Officer of Health, Kumasi, made the following statement :—

"Several cases came under the writer's notice during the year in patients undergoing treatment in the Contagious Diseases Hospital for communicable diseases. The majority of the patients were infected with the *T. saginata* and were of Northern Territory origin. This would point to the desirability of greater attention to be paid to the question of the disposal of human excrement in the Northern Territory villages. The percentage of animals found infected at the Public Slaughter House is small—only seventeen cattle and thirteen pigs out of 1819 and 538 slaughtered having been found infected with *Cysticercus bovis* and *Cysticercus cellulosæ* respectively."

The higher incidence in members of the Northern Territory tribes was confirmed by the Medical Officer, Zuaragu, in his report stating that the one hundred and twenty-nine cases of the disease formed nearly thirty-one per centum of all cases of sickness treated by him.

Preventive measures, apart from the provision of sanitary convenience, included the inspection of animals at slaughter houses.



THE NEW PUBLIC SLAUGHTER HOUSE AT KUMASI.

The following numbers of animals slaughtered at Accra, Kumasi, Sekondi, Cape Coast and Koforidua where Medical Officers of Health were stationed during the year were all carefully examined before and after death :—Cattle 5,102, sheep 9,089, goats 13,941 and pigs 8,118.

Schistosomiasis.

Cases of bilharzia almost invariably of the *Hæmotobium* variety are discovered from time to time.

Intravenous medication with antimony effected several cures. The fouling of wells, ponds and streams was discouraged as far as possible.

Trichinosis.

No cases of this disease either in man or in animals came under observation.

Preventive measures were directed against rats and their entry into slaughter houses and meat stores.

Dracontiasis.

As might be expected, in the major portion of cases of guinea worm the infection was acquired owing to the poor quality of water supplies in many areas.

The Medical Officer, Zuaragu, stated in his Annual Report that forty-six or ten per centum of all the patients he treated were cases of guinea worm infection.

Preventive measures consisted in the improvement of water supplies in some rural areas by the Government and by persuading chiefs and headmen of smaller centres of population to take an interest in the protection from pollution of public supplies.

Private individuals possessing wells were persuaded to protect same by raised copings, cementing the surrounding area, fitting pumps, windlasses, etc.

The position as regards water supplies, more especially in the Northern Territories, is far from satisfactory and money spent on the improvement and protection of public water supplies would be well spent and would undoubtedly result in a general improvement of health conditions. The Medical Officer, Salaga, in his Annual Report for 1926-27 made the following statements :—

“ The water supply is from shallow wells. None of them are protected from subsoil contamination. This season there was great shortage of water in this district and some people were carrying water four or six miles for domestic use. ”

The Medical Officer, Wa, further substantiated this point in his Annual Report for the same period in the following words :—

“ There are many wells dug by the people for themselves but many people are still dependent upon the water holes. These are filthy as they are the watering places for all the cattle, sheep, horses, donkeys etc., and are frequently inhabited by crocodiles. There is no possibility of closing them at present, unfortunately. ”

(IV)—GENERAL MEASURES OF SANITATION.

Sewage disposal.

This varied in the different towns. In sea coast towns the greater part of the night-soil was thrown into the sea. The modified Imhof tanks and filter beds in connection with the water carriage system in vogue in Korley Bu at Accra continued to give every satisfaction. In inland towns disposal was effected either into deep fly-proof pits or into long shallow trenches.

Actual details of the number of pans cleared in the six stations in which Medical Officers of Health are stationed are given in Table IX in the appendix.

Refuse disposal.

Incineration of refuse was aimed at generally throughout the Colony but, owing to shortage of staff making supervision difficult except in the larger centres of population, the process was far from complete.

The chiefs and headmen of rural areas were encouraged to construct circular incinerators of mud of the army field pattern and, where interest in sanitary matters was evinced, were given short lengths of old railway rails to serve the purpose of iron gratings. This type of incinerator if tarred on the outer surface and if protected from heavy rain by palm branches can be used over a period of years.

In larger towns where the chiefs and their people had shown keenness in improving the health conditions the Government constructed a number of brick destructors. Useful reclamation of low-lying areas was effected by filling with incombustible material and ashes from incinerated refuse the whole being top-dressed with soil to a depth of a foot or more.

Drainage.

Subsoil drainage in the form of "Dutch" drains was carried out in various low-lying areas in Kumasi.

Surface drainage in the form of earth drains and herring-bone cuts formed one of the routine anti-malarial activities as in past years. Concrete drains were constructed in the larger centres more particularly in Kumasi where 1459 linear yards were made in connection with the main key drain of that town.

Water Supplies.

The periodical bacteriological reports on the pipe-borne water supplies at Accra and Sekondi showed that the general standard was satisfactorily maintained during the year. Actual details are given in tabular form in the appendix to this report.

The supply at Winneba was examined bacteriologically on four occasions during the year and on each occasion no *b. coli* were found to be present in 100 cubic centimeters of the water.

The Medical Officer, Winneba, reported that the supply was a good one. Progress was made on the provision of a water supply for Cape Coast.

After very careful investigations the question of obtaining a water supply from a tributary of the Adra river to the south-west of Kumasi was definitely decided against and it is possible that the Offin River at a point about 12 miles north-west of Kumasi will be the source eventually.

The scheme for pumping water from public wells in Kumasi and for chlorinating the water prior to it being drawn off by the general public was almost completed and should be in operation before the end of Summer 1927.

Some of the steps taken to improve the water supplies of smaller towns and villages have been referred to under *Helminthiasis supra*.

Offensive Trades.

There are few offensive trades in the Colony. The Medical Officer of Health of Accra, made the following observations in his Annual Report in connection with an offensive trade:—

"During the latter part of the year all fish ovens were removed out of Accra central area. A site on the east of the Korle Lagoon was laid aside as a fish curing area and the Sanitary Department built one oven as a model to be followed. No ovens have yet been built, hence, most of the fish curing is being done outside of Accra, with undoubted benefit to the town."

Bye-laws relating to the storage of fish—including "stink" fish—and to bakeries were introduced in Kumasi. The tanning of hides prior to export also required control at Kumasi.

Clearance of bush, etc.

The clearance of bush was carried out by paid labour in the larger centres while in the smaller towns and villages endeavours—often unsuccessful—were made to induce the headman of the town or village to clear an area of at least fifty yards round the outskirts of the town or village.

Sanitary Inspections.

House-to-House inspections numbered 620,351.

The larval index in the five more important towns was as follows:—

Accra 0.63, Kumasi 0.27, Cape Coast 0.75, Sekondi 0.31 Koforidua 1.87.

Prosecutions numbered 17,574 throughout the Colony and resulted in £6,979. 19s. od. being recovered on fines;



CHLORINATION SYSTEM FOR PURIFICATION OF WATER SUPPLIES FROM PUBLIC
WELLS AT KUMASI IN PROCESS OF CONSTRUCTION.

V.—SCHOOL HYGIENE

With the introduction of the Ordinance No. 21 of 1925, requiring all school teachers to be registered and to possess a certain standard of educational attainment and insisting upon the compliance with the minimum of sanitary principles, the general standard of school hygiene undoubtedly improved during the year. In certain areas, however, for example, Cape Coast, the standard of hygiene as regards sanitary conveniences left much to be desired.

Plans of new schools were submitted to the Officers of the Sanitary Department whose recommendations were given effect to.

Periodical inspections of school buildings, sanitary conveniences and surroundings were carried out and improvements were made where practicable.

A portion of Achimota was opened for boarders during the year.

A new school was built at Kumasi and many excellent village schools were built by the Missions at Saltpond, Swedru, Effiduasi, Mampon, Kumasi, Bechem and elsewhere. School children at Accra, and Sekondi were examined from time to time by the Lady Medical Officers and at Kumasi, Cape Coast and Koforidua by the Medical Officers of Health. The Lady Medical Officer in Accra reported, *inter alia*, on the health of the school children as follows :—

“ Children from the following schools were examined :—

“ Government Girls 49, Wesleyan Girls 10, Government Junior Boys 128, Achimota Kindergarten 55, Scottish Mission Infants 91, Scottish Mission Kindergarten 212, Scottish Mission Junior 62, Re-examination of Government Junior Boys 150.

“ A total of 657 school children were examined or re-examined during the year. Of this number 576 were examined in September and the following months, and of this number 339 children or 59 per centum of the number examined were found to have one or more defects. Though this seems to be a very formidable total at first sight, the general health of the school children was good ; most of these defects not being of a serious nature, enlargement of the spleen, enlarged tonsils and decayed teeth being responsible for a large proportion of the total defects.

“ The chief defects were :—

Defect.	Number.	Ratio to number examined.
Enlarged spleen	111	19.2
Septic mouth and teeth	93	16.1
Enlarged tonsils	90	15.6
Enlarged glands (chiefly submaxillary)	60	10.4
Eyes (chiefly conjunctivitis) ..	29	5.0
Yaws	25	4.3
Lungs	20	3.4

“ Twenty-three children or 3.9 per cent were found suffering from malaria at the time of examination. The age of the majority of these children ranged from 5–12 years, though some of the the pupils examined at the Scottish Mission Junior School and at the Government Junior School (Boys) were older than that.

“ Two-hundred and forty-seven children were treated at the Princess Marie Louise Hospital Clinic and three-hundred and seventy school children were treated at the Christiansborg Clinic, making a total of six-hundred and seventeen children treated.

“ Most of these were for minor ailments, cuts, bruises, colds, etc., but 186 school children (30 per centum) were treated for malaria and unclassified fevers and seventy children (11 per centum) for conjunctivitis.

“ These were the two chief diseases treated in school children. Few of the malaria cases seen were of a serious nature.

“ On the whole the health of the school children was satisfactory. ”

At Sekondi, the Lady Medical Officer reporting on the health of the school children gave the following figures :—

Number of school children examined	941
Number found to require treatment	384
Percentage requiring treatment ..	40.8

Defect.	Number.	Ratio to number examined.
Enlargement of spleen	358	38.0 per centum
Septic mouth and teeth	254	26.9 „ „
Enlarged tonsils	35	3.7 „ „
Enlarged glands (chiefly inguinal) ..	343	36.4 „ „
Eyes (chiefly conjunctivitis) ..	114	12.1 „ „
Yaws	11	1.1 „ „
Lungs	43	4.5 „ „
Malarial parasites	63	6.6 „ „

The Medical Officer of Health, Kumasi, who examined 1859 school children during the year and who gave a course of quinine to those with enlarged spleen reported as follows :—

“ Some 1859 scholars attending the Government and Assisted schools were examined in December, 1926, and 578 or 31 per centum were found to be suffering from splenomegaly of probable malarial origin.

“ This compares with 588 or 30.9 per centum of 1,802 scholars examined in 1925, and 218 or 46.5 per centum examined by the late Director of Medical and Sanitary Services when Acting Medical Officer of Health, Kumasi in 1915.

TABLE VI.

Age.	No. Examined.	Normal.	Per- centage Normal.	ENLARGED.					
				2*		3†		4‡	
				No.	%	No.	%	No.	%
5-8 ..	477	270	56.6	125	26.2	79	16.5	3	0.6
9-11 ..	299	180	60.2	74	24.7	39	13.0	6	2.0
12-14..	538	405	75.2	86	15.9	45	8.3	2	0.3
15-over	545	426	78.1	90	16.5	28	5.1	1	0.1
Average and Totals.	1,859	1,281	68.8	375	20.1	191	10.2	12	0.6

2. * Slight enlargement or palpable to the costo-abdominal margin.

3. † Medium enlargement or palpable from the costo-abdominal margin to the umbilicus.

4. ‡ —Great enlargement or palpable below the umbilicus.

“ Quinine was supplied to a number of volunteers who were found to be suffering from the higher degrees of splenomegaly.

“ The need for a child welfare centre and school clinic should be apparent from the above figures and there would appear to be every hope of this service being inaugurated in 1927-28.”

The Medical Officer of Health, Koforidua, gave the following details of his examination of school children at Koforidua.

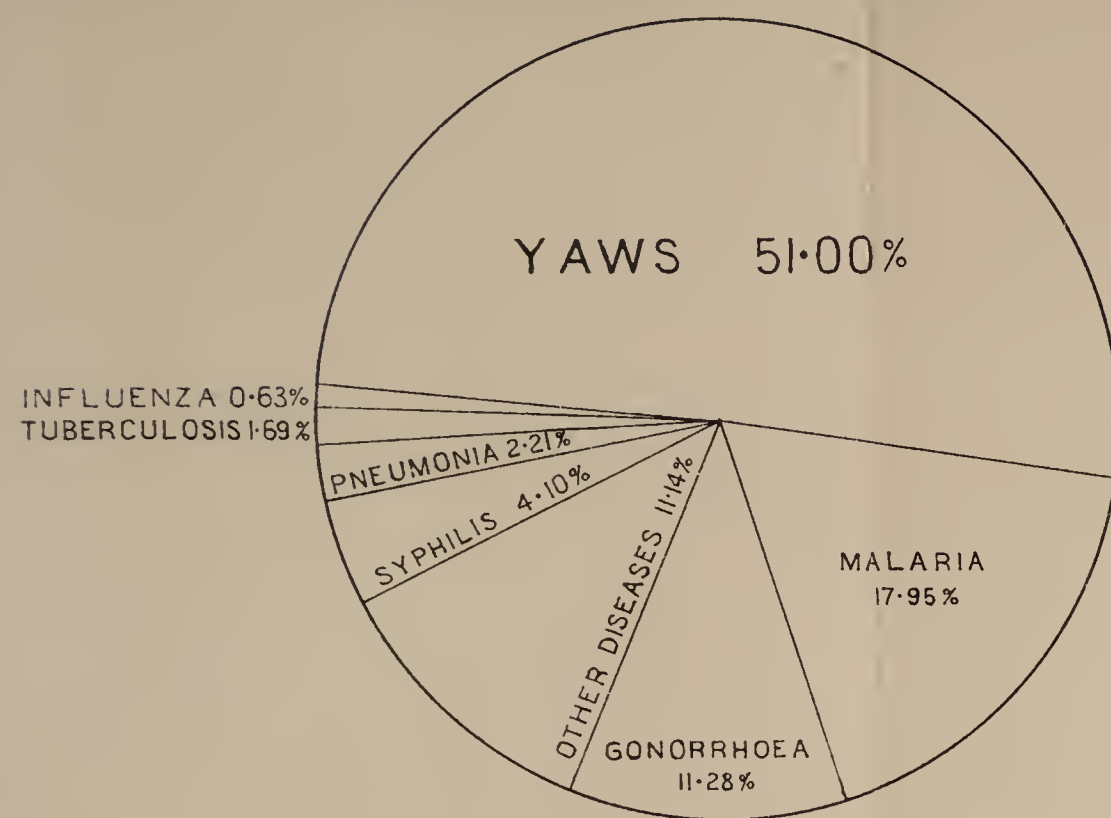


BIRDS-EYE VIEW OF ASERE CONGESTED AREA, ACCRA, SHORTLY TO BE RELIEVED
BY HOUSING SCHEME.

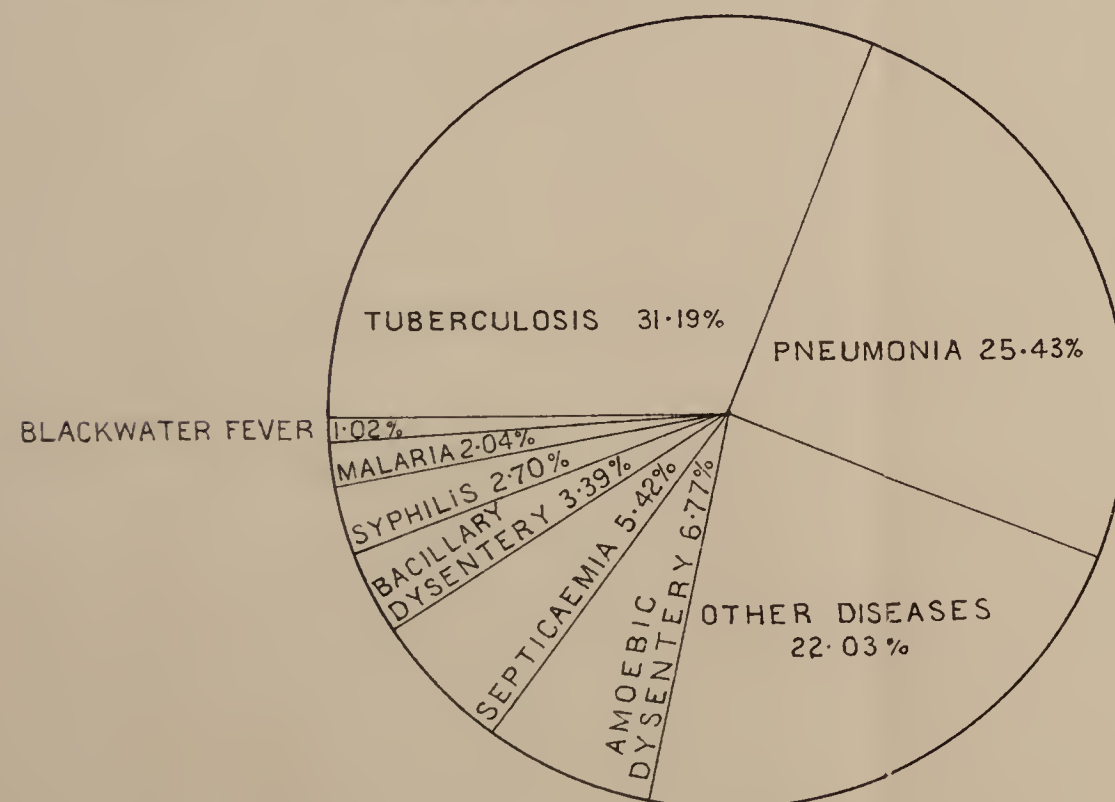
FOUR DIAGRAMS REPRESENTING IN GRAPHIC FORM THE INCIDENCES OF INFECTIVE AND OTHER DISEASES.

INFECTIVE DISEASES.

TOTAL INCIDENCE = 35,807.



TOTAL DEATHS = 295 = .82% OF TOTAL INCIDENCE.

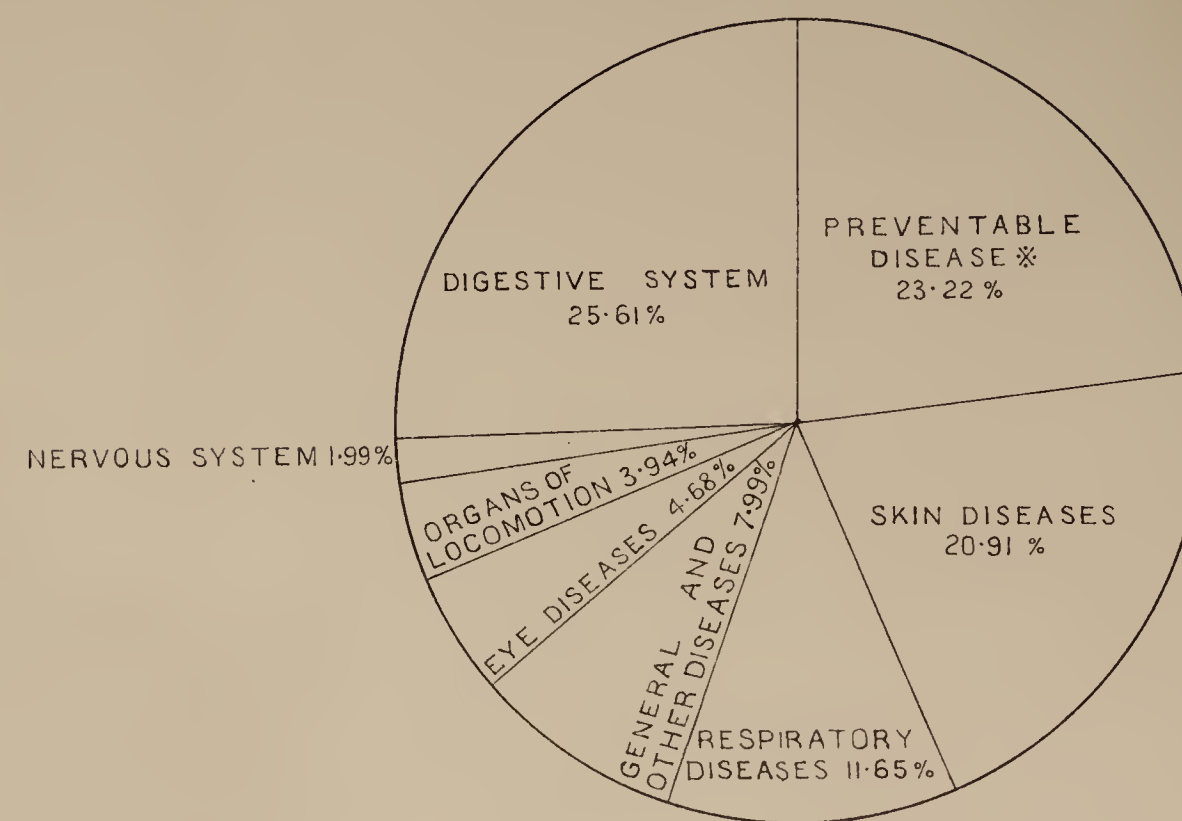


※ THE DISEASES CLASSED AS PREVENTABLE ARE

- (A) INFECTIOUS DISEASES.
- (B) INTOXICATIONS.
- (C) SCABIES.
- (D) INJURIES.
- (E) POISONS.
- (F) HELMINTHS.
- (G) INSECTA.

GENERAL SYSTEMIC & PREVENTABLE DISEASES.

TOTAL CASES = 61,690.



TOTAL DEATHS = 597 = .97% OF TOTAL CASES.



Defect.	Number.	Ratio to number Examined.
Enlarged Spleens	571	79.8 per centum.
Septic mouth and teeth	76	10.6 " "
Enlarged glands (chiefly inguinal)	843	17.9 " "
Eyes (conjunctivitis and bad vision)	4	0.5 " "
Yaws	105	14.6 " "
Lungs	1	0.1 " "

From Cape Coast the following statistics were submitted by the Medical Officer of Health :—

	Number examined.	Number with enlarged spleens.	Percentage with enlarged spleens.
Cape Coast	518	163	31.46

The outstanding feature elicited from a comparison of the statistics for the five towns is the very heavy splenic index and the high percentage of cases of yaws and of the condition of enlarged glands in Koforidua as compared with the relatively low splenic index of Accra.

The figures confirm the need for School Medical Officers and for further anti-malarial work.

VI.—LABOUR CONDITIONS.

Apart from a certain proportion of indentured labour employed on Municipal work or by a minority of firms, labourers are free agents to come and go as they like.

In the larger centres, for example, Accra municipal labourers are housed in satisfactory dwellings and receive medical attention.

In the case of commercial firms, labourers are some times housed in premises which are not always satisfactory but usually find their own accommodation in the neighbouring towns and villages. Labourers on large construction works either build temporary bush camps or live in neighbouring villages and thereby cause somewhat undesirable congestion.

In mining areas labourers are housed in lines or villages some of which are satisfactory but some of which afford an adequate explanation for the high incidence of pulmonary tuberculosis and other diseases in this class of labour.

In certain cases the springing up of villages for mine labourers on the outskirts of existing villages has an undesirable effect on the amenities of an existing village and makes it difficult to persuade the permanent inhabitants to take a pride in their village or to build hygienic houses in accordance with a settled layout. Recruitment of labour from the Northern Territories has almost entirely ceased and the more important mining corporations rely upon locally employed labour. The declaration of mining health areas and the gradual application of the provisions of the Ordinance relating to same should have a salutary effect.

VII.—HOUSING AND TOWN PLANNING.

New Building Regulations, which with minor modifications to conform with local conditions, should be capable of general application in all the more important centres in the Colony and Ashanti so securing as much uniformity as possible, were under consideration during the year under review. This resulted in a certain amount of delay in the passing of building permits but it is anticipated that the matter will be satisfactorily settled early in 1927-28.

The general improvement in housing conditions was maintained during the year. In Ashanti the solid swish wall with adequately ventilated room was insisted upon in all the large and many of the smaller centres in cases where funds did not permit of the construction of houses in brick, concrete blocks or reinforced concrete. Would-be builders were dissuaded as far as possible from building in swish and wattle since such houses become ruinous in a short time, the wattle rotting or becoming ant-eaten and the hollows so formed in the walls serving as nests for rats and mice and a variety of insects.

Well ventilated swish houses where the floor is of rendered concrete and where internal and external walls are faced with cement proved to be both cool and sanitary. Adequate supervision is necessary, however, to ensure that houses of whatever type are not altered or added to so as to be rendered unhygienic.

This desideratum is not possible of attainment in most localities owing to limitations of staff. Houses which, at one time completely satisfy all the requirements of hygiene, become insanitary and an otherwise satisfactory area becomes congested and unhealthy.

An admirable scheme is under consideration by the representatives of the Wesleyan Mission on the Gold Coast for building quarters in which to house boarders, in the form of individual compound houses as similar as possible to type of houses preferred by the African but embodying the principles of hygiene. Such compounds which would serve as dormitories with a dormitory captain or "father" in control would serve as an ever present object lesson to the boys of how persons can live in comfort and in good health. At the end of their training the boys would thus have a very good idea of how health and comfort, as far as housing is concerned can be obtained. This knowledge would be capable of rapid dissemination throughout the Colony.

The single example in one village of a satisfactory house in certain of the more enlightened inland areas is not infrequently sufficient to stimulate others to possess a similar type of house.

Housing in certain of the mining areas still gives grounds for apprehension but the gradual application of the Mining Health Area Ordinance—the inception of which was the result of Sir William Simpson's visit to the Colony in 1924—to such areas should bring about the improvement desired.

As regards the housing of Europeans, it is still a matter of great regret that insufficient attention is paid to the benefits accruing from living in residential areas reserved for Europeans and that some commercial organisations still encourage their representatives to live in the African townships. Tragedies follow this neglect of obvious precautions but bitter lessons are often learnt in vain.

The type of bungalow for European Government officials underwent some improvement during the year and a two-storey type was constructed. This type lacks verandahs which, in the writer's opinion, are indispensable, and it is not mosquito-proofed.

Much benefit should accrue from the application of the provisions of the Town Planning Ordinance passed in 1925 but appreciable results are not likely to be manifest for some time.

In the meantime good work is being done as regards villages and small townships more especially in Ashanti where considerable progress was made during the year in the laying out of small centres of population. The applications to the Health Authorities through the local Commissioners of Districts from chiefs for assistance in laying out new towns and villages were more numerous than the existing staff could cope with. Progress was made in several of the new layouts in connection with villages situated along the railway.

The new zongo at Kumasi built in 1924 consisting of thirty-six compounds each containing twelve rooms continued to be a popular feature and a sum of over £1,380 in rents was obtained from the residents in 1926-27. With the rapid development of the Gold Coast along the ever lengthening and improving lines of communication, the necessity for an adequate staff of Europeans and African Building Inspectors and Overseers is apparent. Only by the efficient supervision of new layouts and building in new areas will it be possible to avoid the costly mistakes of the past which are responsible for many of the congested and insanitary areas to be found in almost every township in the Gold Coast Colony.

VIII.—FOOD IN RELATION TO HEALTH AND DISEASE.

Routine inspection of foodstuffs in public markets and stores was carried out by the officers of the Sanitary Department in all the larger centres of population. Storekeepers as a rule afford every facility to the inspecting officers and it is seldom necessary to seize unsound food since voluntary surrender is almost invariably the rule. In addition, the inspection of cattle was undertaken by officers of the Veterinary Department in the Northern Territories—cattle quarantine stations being maintained at Magonawri, Pusiga, Paga, Baghri and Kudani.



PART OF THE NEW HAUSA ZONGO AT KUMASI.





THE NEW SALAGA FRESH MEAT AND FISH MARKET, ACCRA.
FLY-PROOF WINDOWS AND DOORS.





PORTIONS OF SELWYN MARKET, ACCRA, SHOWING CONGESTION SHORTLY TO BE RELIEVED BY OPENING OF EXTENSION SHOWN ON OPPOSITE PAGE.



Cattle plague continued to be a serious source of loss.

The following notice issued by the Veterinary Department is of considerable interest:—

VETERINARY NOTICE.

TABLE VII.

The following comparative table gives the numbers of cattle, sheep and goats that crossed the various ferries from the Northern Territories into Ashanti during March quarter of 1925, 1926, and of 1927. The figures indicate the quantity of Livestock available for human consumption in the Gold Coast Colony and Ashanti during those periods.

Station.	1927	1926	1925	1927	1926	1925
	Cattle	Cattle	Cattle	Sheep and Goats	Sheep and Goats	Sheep and Goats.
Yeji	10,471	6,430	5,171	5,658	3,632	2,857
Bamboi	1,901	1,739	1,814	3,540	3,790	3,769
Buipe	328	2,989	1,999	15,892	12,092	10,256
Kratchi	1,402	1,654	4	2,231	2,668	1,104
Totals	14,102	12,812	8,988	27,321	22,182	17,986

Animals for human consumption were examined prior to slaughter and the organs and flesh was examined after slaughter at the main centres in the Colony where slaughter houses are established.

An up-to-date slaughter house was constructed at Kumasi and opened at the beginning of the year under review. Here animals were killed with Cash's Captive Bolt pistols. Slaughter Houses in smaller centres and slaughter slabs were constructed in various towns in the Colony and Ashanti to ensure killing of animals under hygienic conditions, and the inspection of all meat.

The number of animals killed at Accra and Kumasi are given below :—

TABLE VIII.

Animal.	Accra.	Kumasi.	Number of carcasses or parts diseased.	
			Accra.	Kumasi.
Cattle	2,913	1,819	586	1,020
Sheep	4,825	3,065	583	91
Goats	4,261	5,095	117	214
Pigs	4,539	538	2,238	
Totals	16,538	10,517	3,524	1,325

In Accra 2.5 per centum of the cattle and 19.9 per centum of the pigs were found to be suffering from cysticercal infection. In Kumasi only one and a half per centum of cattle and pigs were found to be infected.

The suggested explanation for the marked difference is worthy of note. Sanitary rules in Ashanti prohibit the keeping of cattle and swine in villages and, instead, the animals have to be kept in the open bush or in pens. The construction of latrines for men and women, moreover, is obligatory.

There are no such rules excepting in the larger centres in the Colony proper and infection from foul ground in villages is inevitable.

A small amount of frozen meat is imported into the Colony at the chief ports but the amount is negligible. On the other hand, large quantities of tinned food-stuffs, some consignments being much below the required standard, are introduced into the Colony. It is a matter of regret that some communities live largely on imported tin foodstuffs or on polished rice instead of consuming fresh local food-stuffs. The number of cases of beri-beri and other deficiency diseases are few compared to the total number of diseases prevalent but there can be little doubt that many cases of gastric upset and malnutrition are attributable to a faulty diet consisting chiefly of tinned food-stuffs. The provision of new and the improvement of existing markets was carried out throughout the Gold Coast and, where Government funds were not available, the chief or headman of the town or village as persuaded in many cases to induce his people to pool resources to erect market stalls. The importance was fully appreciated of making provision for the sale of food under hygienic conditions rather than under bad conditions where the liability of contamination by food and flies existed.

B.—MEASURES TAKEN TO SPREAD THE KNOWLEDGE OF HYGIENE AND SANITATION.

Hygiene is taught in the schools and the co-operation of school children in Health, and Clearing-up Days is always sought by the organisers. Special lectures are given to school children during epidemic periods drawing attention to the preventive aspects of the disease.

Practical demonstrations and exhibitions of sanitary material are held from time to time for the benefit of children and adults.

Health Weeks took place at Accra, Cape Coast, Winneba, Saltpond and Kumasi during the year and lectures, demonstrations, displays and Baby Shows were held. As far as possible all elements of the community were persuaded to take an active part in the activities of Health Weeks, including clerks, storekeepers, soldiers, police, labourers, school children, chiefs, headmen, members of the mercantile community, etc.,

In addition to these special measures, the officers of the Sanitary Department during routine house-to-house visits gave advice to householders on how to keep their premises free from nuisances and themselves from falling sick. Only when such advice was wilfully disregarded and nuisances remained unabated after warning notices was legal action taken.

Model layouts complete with latrines for both sexes, swish incinerators, markets, shade trees, measured house plots, regular streets and lanes and hygiene types of dwellings were constructed with communal labour in various districts and served as examples to be followed by other villages and townships.

C.—TRAINING OF SANITARY PERSONNEL.

As in past years the training of Sanitary Inspectors was carried out by a specially trained officer in Accra and further training was given by Health Officers in the larger towns both by way of lectures or else by means of practical demonstration and field work. The present system in vogue is for an officer to receive two years training in the Sanitary Training School in Accra and then to be sent under supervision to carry out the duties of a Sanitary Inspector in a small district where he can be kept under supervision.

D.—RECOMMENDATIONS FOR FUTURE WORK.

1. The "Recommendations" in the Annual Medical and Sanitary Report for the year 1925-26 concerning pipe borne water supplies for the Cape Coast, Koforidua and Kumasi have not yet borne fruit although good progress has been made on the Cape Coast water scheme. These are urgently needed.





PORTION OF SELWYN MARKET, ACCRA, SHOWING SIDE STALLS,



EXTENSIONS TO SELWYN MARKET IN COURSE OF CONSTRUCTION.

2. The provision of water-carriage systems for the removal of nightsoil more especially from the public latrines in Accra and Sekondi where there are ample pipe-borne supplies would result in a considerable lessening in the incidence of diseases of the gastro-enteric type apart altogether from adding to the amenities of these ports.

3. Adequate sanitary staff—including Village Overseers—is required to raise the standard of sanitation including housing conditions and to meet the obligations of Government in connection with the ratification of the International Sanitary Convention of 1926. It is significant in relation to this that a very serious outbreak of yellow fever occurred in the Akwapim district and remained undiscovered for over two months by which time a heavy death roll and the dissemination of infection to other areas had resulted.

4. Adequate staff of European and African Building Inspectors are required to supervise building and layouts in the rapidly growing towns and villages in the Colony and Ashanti. Neglect of this in the past—probably owing to lack of funds—has resulted in the very unsatisfactory housing congestion in many important towns.

5. A better type of bungalow for Europeans is required more especially for those parts of the Colony where the amenities are few and where the discomforts are many. For all practical purposes the best type of bungalow should be built in those arid areas in the Northern Territories where the noonday glare and heat has to be experienced to be realised. A satisfactory type of bungalow is also required in the steamy inland forest zone. The amenities of the coast towns as regards fresh sea breezes, water supplies, electric lighting, fresh fish, etc., and the absence of the discomforts of life present in inland areas render the question of the type of bungalow of less importance. It is suggested that no bungalow or hospital should be built unless the floor is raised at least six feet from the ground and unless verandahs are provided and the whole is mosquito proofed.

6. Active propaganda is needed to bring home the importance of European residing in residential areas reserved for the European race. Year after year goes by during which valuable lives are thrown away owing to the disregard of this elementary principle.

7. The desirability of making reservation areas for Syrians so many of whom die of yellow fever, blackwater fever and allied diseases and who are a source of danger to themselves as well as to the whole community calls for early consideration.

8. To obviate the unfortunate antagonism that exists in certain quarters to the reservation of areas for Europeans, the question of providing good land as sites for first-class African residential areas is worthy of careful consideration.

9. The establishment of a small staff of African Health Visitors to act as liaison officers between the Medical Officers of Health and their staffs, and the officers in charge of child welfare centres and maternity hospitals might well receive consideration.

P. S. SELWYN-CLARKE, M.D., M.R.C.P.,

Acting Deputy Director of Sanitary Services.

IV.—PORT HEALTH WORK AND ADMINISTRATION.

Up to the present no separate staff has been employed in connection with Port Health Administration. The Medical Officers of Health, Accra, Sekondi, and Cape Coast and the Medical Officers at Keta, Ada, Winneba, Saltpond and Axim have acted as Port Health Officers in addition to their other duties.

Provision has been made for a whole time Port Medical Officer for Takoradi to meet the special conditions that will arise on the completion of Takoradi Harbour. The necessity for the appointment of a similar Officer who would also act as Assistant Medical Officer of Health at Accra was manifest during the period under review.

The Accra Municipal Area is too extensive to make it practicable for one officer to act as Medical Officer and Port Officer at the same time especially in view of the fact that ships from infected ports have to be boarded and cleared before *libre pratique* can be granted. The performance of these duties renders it necessary for an officer to be absent over a prolonged period from the town while inspecting and dealing with infected ships.

Meanwhile, matters affecting the municipality requiring urgent attention as, for example, the occurrence of cases of plague, yellow fever, etc., cannot be dealt with.

In addition to the examination of infected ships and of ships arriving from infected ports including passengers and crews, routine examination is carried out on all indentured Kroo labourers who land at the more important ports. In Accra in 1926-27 examinations of Kroo immigrants numbered 2,928.

A new inspection and disinfection station was constructed close to the landing stage at Accra towards the end of the year under review. This should greatly facilitate examinations, disinfections, and disinfestations. Another branch of port sanitary work related to the examination of intending passengers from Accra at such time as Accra was in quarantine owing to an outbreak of infectious disease.

V.—MATERNITY AND CHILD WELFARE.

On the closing in April, 1926, of the Child Clinic previously carried on in James Town, the Princess Marie Louise Hospital for Children was opened.

The Princess Marie Louise Hospital is a well built well equipped building with consulting room, dispensary, laboratory, store room, bath room, offices etc., and 2 upstairs Wards with 10 children's cots and room for 3 or 4 beds for mothers with sick infants.

The Out-patient Clinic is very well attended indeed and absorbs most of the time of the Lady Medical Officer. During the year 5,009 new cases and 2,207 old cases were treated, and attendances reached the very satisfactory total of 12,278.

The commonest diseases dealt with were malaria and unclassified fevers (heading the list) 32.9 % of the total, respiratory diseases 17.5 % and enteritis 13.8 %.

Enteritis in children has been found to be a very common and serious complaint. As a cause of death amongst in-patients it has been found to be far more fatal than malaria in proportion to its incidence.

Cases of yaws have not been very common.

N.A.B. and B.S.T. have acted well. Trachoma is fortunately uncommon, as it is very difficult to secure regular attendances for treatment.

Some diseases common in England are rare in Accra, *e.g.*, rickets, and tuberculosis of lung and gland or bone. Severe cases of ænaemia, in the other hand, not common in England are frequent in Accra. Dirty and neglected teeth and gums, especially up to the second dentition are as common here as in England.

In-patients.

Mothers are at present reluctant to allow their children to remain in the Hospital. The Wards were opened in May 1926. 186 patients, of the average age, of 3 years were admitted and stayed an average of 12 days each. 14 died, of whom 9 were under 1 year of age. Malaria and enteritis were responsible for the largest number of cases and formed together over one third of the total admitted. Enteritis (4) marasmus (3) malaria (2) pneumonia (2) were the chief causes of the deaths.



QUARANTINE STATION, ACCRA.

Christiansborg Clinic.

Here the total number of patients was 1,615 with total attendances 3,962. Of cases treated malaria with 27%, enteritis with 22%, and respiratory diseases with 19% were most common. malaria and enteritis together accounting for nearly half the total patients. Whooping cough, (6%), conjunctivitis (4%), gingivitis (3%), otitis media (2%), yaws (2%) trachoma (5%) are amongst the other diseases treated. For School Hygiene work which is also undertaken by this Clinic, see under III A. (V) page 28.

Sekondi and Chama Clinics.

Summarized figures are as follows:—

Sekondi:—

New patients ..	..	..	..	..	2,719
School Children ..	..	..	..	..	1,419
Other Children ..	..	..	..	..	1,210
Total visits ..	..	..	..	..	11,605

Chama:—

New patients ..	..	..	..	..	608
Old patients ..	..	..	..	..	571
Total attendances ..	..	..	..	..	1,137

Kumasi.

It is intended to extend to Ashanti the benefit of this work for the Children and an Infant and Child Welfare Centre is to be constructed in Kumasi in 1927-28

Maternity Work.

As will be seen from above remarks excellent Infant and Child Welfare work is being done, but the only work under the heading of Maternity that is being carried out at present comes under the general measures carried out by the Medical Officers of Health and their staffs, which include Female Sanitary Inspectors, part of whose duty is to advise pregnant or puerperal women as to themselves and their babies, domestic arrangements etc,

The New Maternity Hospital referred to in the previous years report has not yet been completed; this will take place in 1927-28. It is confidently expected that this Hospital will do much to bring down the high mortality amongst puerperal women in Accra.

It will constitute an important centre for ante-natal, and post-natal work and for the training of midwives. It may be found possible later on to establish a small staff of African Health Visitors to work in conjunction with this Hospital under trained European supervision, and such a system would certainly help considerably to reduce maternity and neo-natal mortality rates.

VI.—HOSPITALS, DISPENSARIES AND VENEREAL CLINIC.

The following Table shews the numbers of in-patients treated at Accra, Sekondi and Kumasi Hospitals:—

Station.	1924-25		1925-26		1926-27	
	European.	African.	European.	African.	European.	African
Accra ..	247	2,024	258	2,372	294	2,640
Sekondi	208	534	228	820	172	885
Kumasi ..	133	1,977	140	2,400	140	1,953
Totals ..	588	4,535	626	5,592	606	5,478

So many constantly varying factors exist that accurate figures of the cost per head per diem in the chief hospitals of the Gold Coast are almost impossible to work out.

European Hospitals.

Fully equipped hospital accommodation for Europeans exists at Accra, Sekondi, Kumasi, Cape Coast, Winneba and Axim. A new hospital was completed at Tamale during the year. At Accra three female wards have been added to provide accommodation for the rapidly increasing female population.

African Hospitals.

The Gold Coast Hospital which was opened in 1923 solely for treatment of Africans is probably the best built and equipped Hospital of its kind in Africa and has the advantage of being in close proximity to the Medical Research Institute which can, by employing scientific laboratory methods, render considerable assistance in the diagnosis of obscure complaints.

Statistics for 1926-27. (Gold Coast Hospital).

Out-patients, Total Cases treated	..	..	11,283
In-patients Total Cases treated	..	..	2,640
Surgical operations, Major	..	..	740
Surgical operations, Minor	..	..	192
Average daily number in Hospital	..	..	200

This large Hospital serves also as a centre for the preliminary training of the Dispensers and Nurses who may afterwards be posted to outstations. At a Medical Conference of the Heads of the Medical and Sanitary Departments of the four British West African Colonies held in December, 1925, it was recommended that a College should be commenced at the earliest possible date destined for the complete training of Medical Practitioners. The Conference recorded its opinion that the Gold Coast offers the best facilities for establishing such a College.

Useful work has been and will continue to be done in the older and more or less well equipped hospitals at Kumasi, Sekondi and Cape Coast. Considerable improvements were carried out during the year at the African Hospital, Kumasi. Antiquated buildings were removed, the Military Ward altered, 3 blocks of old staff quarters were altered and converted into extra wards, the latrine system was entirely remodelled, two new blocks of quarters for African Staff were completed etc. This was done under an Ashanti Hospitals Improvement Programme. Further, a new store was completed in May, 1926, for Ashanti, and is a very satisfactory building.

At Bekwai a new hospital with four beds was opened at the beginning of the year and an operating theatre added towards the end of the year.

At Oda, an important centre on the new Central Province Railway, a standard type new hospital and dispensary with quarters for European and African Staff is being erected. It will be completed about September, 1927.

A new African Hospital with twenty beds and administrative offices and also a Sub-Research station were erected at Tamale during the year.

Every station at which a Medical Officer is stationed is provided with a Hospital for Africans and a dispensary and nearly all have a modern operating theatre. Drugs and dressings etc., are supplied regularly in order to enable them to carry out their duties efficiently.

In Appendix D will be found a list showing all the Hospitals and Dispensaries in the Colony.

Special Activities.

A new maternity hospital is in course of erection near the Gold Coast Hospital. It will be completed in 1927-28. For further information see under Heading V.

The Princess Marie Louise Hospital for children was opened in April, 1926. There is a European Lady Medical Officer in charge with two African Nurses and a subordinate African staff. Attendances at the average rate of 1,000 a month have been recorded. It is intended, if possible, to attach a European Nursing sister to this hospital during 1927-28. For work done see Heading V.

Table V. and Table VI. show the summaries of In-patients and Out-patients for the year treated in the hospitals and dispensaries in the Colony. The figures for the Venereal Clinic are included in the out-patients table.

REPORT ON THE WORK OF THE X'RAY DEPARTMENT DURING THE YEAR 1ST APRIL, 1926 to 31ST MARCH, 1927.

During the year under review the Assistant Radiographer, Mr. A. Buckner, carried out the work of the Department until the 25th December.

Mr. C. J. Price, Dispensing Instructor, took charge from 26th December, 1926, to the 31st January, 1927, when the Assistant Radiographer resumed duty.

Mr. D. H. Brayne, Radiographer, arrived in the Colony on the 2nd February, 1927, and assumed duty.

The total number of cases dealt with during the year was 1,014, an increase of 266 over the previous twelve months classified as under :—

Examination of bones	..	..	..	..	587
" " spine	..	..	..	..	5
" " head	..	..	..	..	57
" " chest	..	..	..	..	113
Barium and opaque meals	..	..	..	..	58
Examination of Abdomen	..	..	..	..	11
" " Gun-shot wounds			..	..	2
" " Kidney		..	..	..	15
" " Aneurism		..	..	..	1
" " Heart	..	..	..	..	14
" " Dental cases	..	..	..	..	50
" " Urinary tract	..	..	..	..	8
" " Tumours	..	..	..	..	3
" " Foreign bodies			..	..	6
Localisation of foreign bodies	..	..	..	..	2
Opaque enemata	..	..	..	..	2
					1,014

Thirty four treatments of radio-therapy were given during the year.

REPORT OF THE WORK IN THE ELECTRICAL TREATMENT DEPARTMENT DURING THE YEAR FROM 1ST APRIL, 1926 TO 31ST MARCH, 1927.

The following treatments were carried out in the Electrical Department :—

Galvanic treatments	..	..	..	..	446
Electrical stimulation of Muscles and Nerves	..				282
Massage treatments	..	..	..	..	904
Radiant heat treatments	..	..	..	..	143
X'Ray deep therapy	..	..	..	..	34
Diathermy treatments	..	..	..	..	223
Total	..	..	..	..	2,034

The diathermy cases recorded do not include those treatments given by Medical Officers in the Theatre.

The total treatments numbering 2,034, being an increase of 637 over the previous year.

VENEREAL CLINIC, ACCRA.—YEAR 1926-27.

A new Venereal Clinic was opened at the Gold Coast Hospital, Korley Bu, on the 4th February, 1927, by His Excellency the Governor.

It is modelled on type 84 recommended by the Ministry of Health in England following Col. Harrison's design, the object being to put into force in Africa principles which have proved so successful in combating venereal diseases in England namely :—

- (1) to render the greatest number of persons non-infective by efficient treatment ;
- (2) to educate the general public on the perils of venereal diseases and to encourage them by every means possible to resort to treatment.

The Clinic has the following accommodation :—

Waiting Room.

Consulting Room.

Special Examination Room.

4 Single Irrigating Cubicles.

4 Combined Examination and Irrigating Cubicles.

General Services Room

The Staff consists of :—

1 Medical Officer

2 Male Nurses

1 Female Nurse

1 Labourer

Extra labour as required.

A Venereal Diseases Clinic was first opened in Accra in February, 1921 and most useful work was done under conditions that were difficult. It is confidently hoped that under the new conditions provided much more valuable work will be accomplished.

FIGURES FOR 1926-27.

Patients treated (old and new cases) Total	..	..	..	..	..	4,496
Gonorrhoea (new cases)	..	..	..	..	..	1,623
Chancroid	..	..	..	..	..	115
Syphilis	..	..	..	..	..	367
Framboesia	..	..	..	..	..	259
N.A.B. injections	..	..	..	..	..	6,409
Mercury	..	..	..	..	..	1,066
Bismuth	..	..	..	..	..	6,272

RETURN SHOWING NUMBER OF CASES TREATED IN THE VENEREAL CLINIC FOR THE YEAR 1926-27 AND CONDITIONS OTHER THAN VENEREAL, INCLUDING CHIEFLY YAWS.

	Primary Syphilis.		Secondary Syphilis.		Tertiary Syphilis.		Congenital Syphilis.		Soft Chancre.		Gonorrhoea.		Conditions other than venereal, including chiefly yaws.		Total.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
I. Remaining on treatment list 1st April, 1926	239	6			249	220	—	—	—	—					976	1,155
II. New cases	91	6	97	156	87	65	—	—	115	—	2	567	206	132	1,190	1,174
(a) Completed I full Course	58	3	32	25	122	39	—	—	—	—	—	—	116	—	324	183
(b) Completed II full Course	19	—	26	10	20	14	—	—	—	—	—	—	41	—	104	65
(c) The full Course	—	—	—	—	—	—	—	—	—	—	300	338	—	—	300	338
(d) The full Course with Final Test	—	—	—	—	—	—	—	—	—	—	102	—	—	—	102	—
(e) Ceased to attend before completion of full Course	16	1	15	12	21	13	—	—	—	—	68	260	57	68	179	354
III. Discharged after completion of Course	19	1	26	10	20	14	—	—	—	—	102	—	39	41	206	66
IV. Remaining under treatment 1st April, 1927	253	8	91	158	173	219	—	—	—	—	233	891	302	113	1,052	1,389

WORK OF THE GOVERNMENT DENTAL SURGEON.

The Government Dentist has been principally stationed in Accra but paid during the year two visits to Kumasi, two to Cape Coast, one to Sekondi and one to Tamale. In Tamale accommodation exists for carrying on dental work, but in the other stations some difficulty has been found in providing suitable living and working quarters for the Dentist and his Assistant. An examination of the Tables given below will show what a considerable amount of useful work has been accomplished amongst all classes of the population and the variety of condition that has arisen urgently needing treatment. There is sufficient illness in the Colony due to dental troubles to keep three or four more Dentists employed and as funds become available no doubt other centres will be opened up. It is hoped in the coming year to add one more Dentist to the staff to be permanently stationed in Sekondi.

The following is a classification of the total patients treated with the figures for 1925-26 for comparison :—

							1925-26.	1926-27.
Official Europeans	..	..	..	..	..	..	509	698
„ Africans	..	..	..	..	..	..	623	872
Total Officials							1,132	1,570
Non-official Europeans	..	..	..	..	..	..	475	559
„ Africans	..	..	..	..	..	..	1,088	1,449
Total Non-officials..							1,563	2,008
Total treated							2,695	3,578

This shews an increase of 32.25% over the previous year.

The following Table shews the number of dental operations performed :—

	Officials.	Non-offi- cials.	Total.
(a) <i>Extractions.</i>			
Local anæsthesia	860	1,996	} 2,933
General anaesthesia	56	21	
(b) <i>Fillings.</i>			
Gold	45	36	81
Amalgam	295	342	637
Porcelain	121	102	223
Cement	46	55	101
Temporary	85	93	178
(c) <i>Dressings.</i>			
Including Root. treatment	260	286	546
(d) <i>Scalings</i>	196	212	408
(e) <i>Bridges, crowns and other restorations</i>	8	13	21
(f) <i>Dentures</i>	103	213	316
(g) <i>Repairs to bridge, dentures, crowns</i>	78	93	171
(h) <i>Minor treatments</i>	103	186	289

The chief pathological conditions met with during the period are as follows :

(1)	Dental caries	2,019
(2)	Dental abscess	734
(3)	Pulpitis acute and chronic	254
(4)	Periodontitis acute and chronic	373
(5)	Excessive calcific deposit	321
(6)	Cases diagnosed as true pyorrhoea alveolaris (chronic sub periodontitis)	314
(7)	Gingivitis	456
(8)	Septic roots	223
(9)	Stomatitis	182
(10)	Sepsis arising in connection with eruption of permanent dentition	97
(11)	Malposition of teeth	23
(12)	Fracture of teeth	18
(13)	Necrosis of alveolus	9
(14)	Neuralgia of non-dental origin	10
(15)	Polypus of pulp	14
(16)	Pulp stones	35
(17)	Excessive post-extraction haemorrhage	23
(18)	Supernumerary teeth	22
(19)	Dental cyst	5
(20)	Epulis	8
(21)	Fibrous Sarcoma of jaw	4
(22)	Antrum disease	2
(23)	Cancrum oris	2

VII.—PRISONS AND ASYLUMS.

THE CENTRAL ASYLUM, ACCRA.

The Staff of the Central Asylum, Accra, consists of the following : —

- I Chief Attendant.
- I Assistant Chief Attendant.
- 15 Male Attendants.
- 3 Female Attendants.
- I Matron.
- I Gate-keeper (vacant during the year).

On 31st March, 1927, there was a total of 244 inmates in the Asylum as compared with a total of 229 inmates on the 31st March, 1926. The corresponding figure for the previous year was 225.

Admitted during the year 109 males and females.

Discharged during the year 24 males and females.

Deaths during the year 67 males and females.

Escape during the year 1 male.

Remaining during the year 244 of which 26 are criminal (all males).

The mental diseases from which the inmates suffered were as follows :

	Males.	Females.
Imbecility	32	2
Mania	77	18
Melancholia	8	1
Homicidal mania	20	—
Suicidal mania	6	1
General paralysis of the insane ..	1	—
Delusional Insanity	22	6
Epilepsy	7	2
Periodical insanity	4	1
Dementia	2	6
Under observation	20	8
Total	199	45

The causes of the deaths were as follows :—

Cardiac Failure	11
Dysentery	10
Apoplexy and cerebral compression ..	1
Ankylostomiasis	4
Asthenia and wasting	8
Pulmonary tuberculosis	5
Epilepsy	7
Debility	5
Colitis	3
Senility	2
Diarrhoea	4
Uraemia	1
Pneumonia	1
Suicide	1
Septicaemia	1
Valvular disease of heart	1
Extreme debility	1
Generalised œdema	1
Total	67

The Central Asylum at Accra was built many years ago when the number of patients was much fewer and modern methods of treatment not known. The present Asylum is not now considered satisfactory. The accommodation is becoming too small and facilities for treatment on modern lines are deficient. The question of erecting a new Mental Hospital on modern lines is a pressing one and is receiving consideration.

In spite, however, of the fact that the accommodation is scarcely sufficient and is being increasingly pressed upon, the general health of the inmates was not unsatisfactory and no epidemic outbreak took place.

There is no other Asylum.

PRISONS OF THE COLONY.

The general health of prisoners throughout the year has been satisfactory. There were no epidemics. The Prison at Ussher Fort is nearing completion and when finished will provide accommodation for the prisoners at present in James Fort. James Fort itself is being altered to provide Warders' quarters and new Debtor and Female prisons. Fort Orange, Sekondi is unsuitable as a modern prison and arrangements are under consideration for the removal of prisoners from there. No long term prisoners are kept there.

At Kumasi an extra block of 36 cells has been completed and these are now occupied. There is more accommodation and better ventilation needed in the prison at Sunyani and alterations are under consideration. Ada prison was closed at the end of the year. Accommodation for female prisoners exists at Accra, Elmina Kumasi and at Keta and in all these prisons the accommodation is satisfactory. The daily average of female prisoners for the year was only 9.86. In 1925-26 it was 25.

At Tarkwa, where pulmonary tuberculosis is not uncommon amongst mine labourers, it has at times happened that a convict labourer has been found to be phthisical.

As prisoners sleep in association cells the danger to other prisoners from such a case is obvious. Local arrangements for isolation have however proved satisfactory. There is special accommodation at Elmina for phthisical cases and where need arises a patient can be transferred there.

Recommendations for the improvement of the ventilation of the prisons at Kintampo, Yendi and Lorha, have been received and are under consideration.

Diet.—Rations are adequate and of good quality. No illnesses due to food have appeared.

Sanitation.—Satisfactory arrangements exist in all prisons.

Average daily Lock-up.

1923-24	..	..	..	1,463.92
1924-25	..	..	..	1,390.57
1925-26	..	..	..	1,433.25
1926-27	..	..	..	1,620.25

Sick List (average).

1923-24	..	..	..	3.2%
1924-25	..	..	..	3%
1925-26	..	..	..	3.1%
1926-27	..	..	..	3.99%

Death Rate.					Total.	Per cent average daily Lock-up.
1923-24	..	..	..	..	32	2.18%
1924-25	..	..	..	..	18	1.29%
1925-26	..	..	..	..	35	2.43%
1926-27	..	..	..	..	30	1.85%

VIII.—METEOROLOGY.

AVERAGE FIGURES FOR THE YEAR 1926-27.

Station.	Temperature.						Total Rain-fall.	Degree of Hum.	Wind.		Remarks.
	Solar Max.	Min on Grass.	Shade Max.	Shade Min.	Range.	Mean.	Amt. in Inch.		Gen. Dir.	Av. Frce.	
Accra	145.8	67.2	84.7	74.2	18.0	80.6	16.13	75.4	S.W.	2.4	
Kumasi	130.5	45.1	80.1	70.1	24.9	78.5	56.81	84.4	—	2.1	
Sekondi	138.4	68.3	84.8	73.8	17.0	79.5	37.23	81.9	—	1.78	
Tamale	150.8	56.4	93.7	69.1	35	81.5	44.45	70.3	—	4.7	

The above figures have been supplied by the Director of Agriculture who is in charge of all the observing stations.

(b) ANNUAL REPORT OF THE ANALYTICAL CHEMIST.

LIST OF SAMPLES DEALT WITH FROM 1ST APRIL TO 31ST MARCH, 1927.

<i>Customs Department.</i>									<i>Number.</i>
Natural Wines	..	..	..	..	..	..	..	..	36
Medicated Wines	..	..	..	..	..	..	..	..	13
Ginger Wines	..	..	..	..	..	..	..	..	11
Vermouth	..	..	..	..	..	..	..	..	10
Liqueurs	..	..	..	..	..	..	..	..	5
Potable Spirits	..	..	..	..	..	..	..	..	16
Beer	..	..	..	..	..	..	..	..	67
Stout	..	..	..	..	..	..	..	..	5
Perfumes	..	..	..	..	..	..	..	..	175
Patent Medicines	..	..	..	..	..	..	..	..	57
Chlorodyne	..	..	..	..	..	..	..	..	2
Polishes	..	..	..	..	..	..	..	..	8
Miscellaneous	..	..	..	..	..	..	..	..	15
Total									420
<i>Medical and Sanitary Services.</i>									
Waters	..	..	..	..	..	..	..	..	12
Disinfectants	..	..	..	..	..	..	..	..	3
Drugs	..	..	..	..	..	..	..	..	1
Fæces	..	..	..	..	..	..	..	..	1
<i>Examinations for Poison.</i>									
Stomach contents	..	..	..	..	..	..	..	..	4
Medicines	..	..	..	..	..	..	..	..	4
Drugs	..	..	..	..	..	..	..	..	2
<i>Gold Coast Railways.</i>									
Boiler Waters	..	..	..	..	..	..	..	..	4
<i>Medical Entomologist.</i>									
Termite cartons	..	..	..	..	..	..	..	..	16
Total									467

The number of samples examined on behalf of the Customs Department continues to increase each year, and considerable attention has had to be directed to questions of the potability of various foreign spirituous liquors, perfumes and patent medicines.

No active poison was present in any of the materials submitted for toxicological analysis; traces of cresol and alcohol were found in the stomach-contents.

Analyses of locally manufactured aerated waters were carried out for the Medical Officers of Health.

Examinations of waters suspected of causing erosion in locomotive boiler plates were made for the Gold Coast Railways.

A number of analyses of Fungus gardens and nest-cartons of termites were made at the instance of the Medical Entomologist and the results of those and other analyses in this connection were embodied in his report on the Eradication of Termites.

During the period under review I was absent on leave from the Colony for two months.

ROBT. SIMMONS, F.I.C.,

Analytical Chemist.

F. S. HARPER,

Acting Director of Medical and Sanitary Services.

30th June, 1927.

IX.—SCIENTIFIC.

(a) ANNUAL REPORT OF THE MEDICAL RESEARCH INSTITUTE, GOLD COAST,
FROM 1ST APRIL, 1926, to 31ST MARCH, 1927.

Staff.—It is gratifying to record that the Staff has been increased and is now sufficient for the running of the Medical Research Institute in Accra and the branch in Sekondi.

It is composed as follows :—

1. Director	Dr. W. A. Young.
2. Pathologist	Dr. A. S. Burgess.
3. „	Major C. M. Ingoldby, R.A.M.C.
4. Assistant Pathologist	Dr. W. Thompson.
5. „	Dr. G. Robinson.
6. Laboratory Superintendent	Mr. F. Leeson.
7. „ Assistant	Mr. F. W. Abbott.
8. „ „	Mr. S. F. Woodward.
9. „ Attendant	Mr. P. C. Paittco
10. „ „	Mr. E. E. Bannerman.
11. Medical Entomologist	Mr. A. W. J. Pomeroy.
12. „ Entomologist's Assistant	J. S. Netley.
13. Second Division Clerk	Mr. J. T. Marbell.
Various labourers, Mortuary attendants, etc.	

The Director has been on duty throughout the year returning from leave on the 14th April, 1926.

He has been responsible for the post-mortem work and histological pathology, which has been more than usually interesting on account of the yellow fever and relapsing fever outbreaks.

He was on trek in the Berekum and Wam divisions of Ashanti leaving Accra 13th May returning 28th May visiting the Sekondi Laboratory and Oda *en route*.

He also made a journey to Salaga—August 5th 11th—to discuss with Captain Beal, Principal Veterinary Officer, the question of trypanosomiasis.

Various visits were also made to Asamankese—Akwatia—Nsawam and Suhum when the yellow and relapsing fever epidemics were on.

Dr. Burgess went on leave on the 11th September, 1926, and returned to the Colony on the 2nd of March, 1927.

He has been mainly occupied in investigating plague vaccines and in conjunction with Mr. Leeson has done considerable research in the matter.

Major Ingoldby who left the Sanitary Department as Plague Pathologist on 24th October, 1925, joined the Research Institute as a Temporary Pathologist for 5 years (this includes the period spent in the Sanitary Department and all leave he is entitled to).

He opened and took charge of the Sekondi Laboratory on the 20th of February 1926 and was in charge till he went on leave on 12th September, 1926. He returned to the Colony on March 15th 1927 and again took charge.

Dr. Thomson is a new appointment *i.e.* Assistant Pathologist. He arrived 1st. September, 1926. His main work has been the investigation of the Dysentery problem. This had been commenced the previous year (see Laboratory Report 1925-26) but owing to lack of staff did not progress readily.

Dr. Robinson is a new appointment being at present seconded from the Medical Staff as Assistant Pathologist. After two years probation if satisfactory he will be confirmed in the appointment.

He arrived and took over the Sekondi Laboratory from Major Ingoldby on September 14th, 1926, and when relieved by the latter on March 15th, 1927, proceeded to Accra.

Mr. Pomeroy, Medical Entomologist. This appointment was made last year. He took up his duties on the 5th December, 1925.

His work this tour has consisted mainly of an investigation into the white ant problem in Accra, and the tsetse fly problem at Yeji on the Volta.

Mr. Leeson has been on duty throughout the year. His duties are various. Apart from routine work he has ably assisted Dr. Burgess in the plague vaccine research.

Mr. Abbott—on duty all the year—was on trek Berekum and Wam Divisions of Ashanti with myself and then Dr. Mathews—13th May to 14th June, 1926—

He proceeded with Mr. Pomeroy to Yeji on November 1st, 1926 and later to Sekondi 31st December, 1926, to relieve Mr. Woodward. He was on local leave October 11th to 31st 1926.

Mr. Woodward has been on duty at the Sekondi Laboratory since it opened until 2nd January, 1927, when he went on leave

Mr. Paittoo Laboratory Attendant, was transferred to Sekondi from Accra May 4th 1926.

Mr. Bannerman, Laboratory Attendant, returned from a month's leave April 3rd, 1926 and has been on duty throughout the remainder of the year.

Mr. Marbell—2nd Division Clerk has also been on duty during the year.

Mr. Netty was attached to Mr. Pomeroy on May 11th and has worked with him throughout the year.

It is a pleasure to record that Polba Mendi, Chief Mortuary Attendant, and headman of the Laboratory servants and labourers, has been awarded the Gold Coast Certificate of Honour and Badge. The following is extracted from the *Gold Coast Gazette* No. 1, 1927 :—

“ Employed as a Dresser in the Medical Department at Bole from 1905 to 1913 and, from 1913 to 1917, worked under Dr. Simpson who was investigating yellow fever at Sekondi. Since 1917 has held his present position in which he has rendered loyal and willing service. Distinguished himself during the Gee rebellion in Sierra Leone when he was wounded. Is a good linguist. ”

Laboratories.—The grounds of the Accra Laboratory improve with time although the lack of rain has considerably delayed growth. However the addition of flower tubs and climbing flowering creepers has greatly enhanced the appearance of the place.

The Sekondi Laboratory is having an Incanto-Acetylene Gas Plant installed This will greatly facilitate work.

The building of a Laboratory in Kumasi is still in abeyance owing to lack of necessary funds, but it is understood that His Excellency has put it down as one of the items of his development scheme for the Colony.

Mobile Laboratory.—This has given entire satisfaction. During the yellow fever epidemics at Asamankese and Suhum it was lent to the Rockefeller commission, who found it of great assistance in their work.

Rockefeller Yellow Fever Commission.—On October 10th 1925 Dr. Beeuwkes (Head) and Dr. Walcott came from Lagos to Accra to view the yellow fever situation in the Gold Coast.

Dr. Walcott finally settled in Accra as, if I may put it so, the yellow fever Intelligence and Clinical Officer in the Gold Coast for the Commission.

The relations between Dr. Walcott and the Officers of the Medical Research Institute have been extremely cordial and we have been of mutual benefit to each other.

As the result of what Dr. Walcott saw here, he suggested that Dr. Muller, Pathologist to the Commission, should come here from Lagos.

Dr. Muller arrived here on the 19th June, 1926.

Part of the Laboratory was put at his disposal and much of the work in connection with the Asamankese outbreak was done here.

Dr. Kligler came and joined Dr. Muller on the 31st July, 1926. Both returned to Lagos on the 18th August.

Dr. Mahaffy visited Accra and Asamankese from July 31st to August 25th.

Dr. Kligler returned for one week to obtain a possible infective yellow fever blood September 19th to September 25th.

Dr. Hanson made an inspection August 28th-September 15th.

Professor Klotz visited the Laboratory on September 25th.

Dr. Sawyer who relieved Dr. Beeuwkes arrived here on the 26th February 1927 (and returned to Lagos 16th March, 1927) to help Dr. Walcott with the outbreak at Suhum.

On 12th March, Dr. Bauer, with two Laboratory Attendants, arrived from Lagos to carry on the Laboratory work and Dr. Sawyer returned to Lagos a few days later.

Dr. Bauer worked in the Laboratory from 12th March, 1927 to 30th March, 1927, when he returned to Lagos, taking all inoculated animals and inoculated culture media with him. On 13th April, Dr. Mahaffy will arrive to relieve Dr. Walcott.

ACCRA LABORATORY REPORT.

YELLOW FEVER.

It is safe to say that during this year there has occurred an unrivalled opportunity of studying Yellow Fever.

Apart from the occurrence of sporadic cases, two epidemics of an extensive nature confined to Africans occurred in inland towns, Asamankese, 51 miles from the coast and Suhum, 43 miles. These outbreaks, away from the coastal areas, appear unique but the uniqueness probably exists in their being discovered and studied.

In other words such outbreaks may have occurred in previous years without being detected because in previous years such places probably existed well off the main high ways. Also it must be remembered that the native recognizes yellow fever; and the inconvenience it causes when official action has to be taken, makes him in his ignorance hide the disease if possible and take his dying sick to the bush.

Other centres of yellow fever outbreaks this year have been Saltpond, Nsawam, Accra and possibly Akuse.

Seventeen complete post-mortem examinations have been made and the tissue from these cases carefully studied by myself—Dr. Muller (both here and at Lagos) and at the yellow fever Laboratory at Yaba, Lagos; also by Professor Hoffmann of Havana, Cuba.

For future reference the names and dates are given in full.

Name.	Date.	Place of infection	No. of p.m.	Made by	Duration. disease.	Black Vomit.	Albuminuria.	Remarks.
Dr. Ranking, W.A.M.S.	25.4.26	Nsawam	6	Dr. Young	6½ ..	+	++	Liver showed marked destruction.
Kwesi Bensil ..	21.5.26	Saltpond	—	Dr. Duff	—	—	—	—
Samson (Kroo) ..	31.5.26	Nsawam	15	Dr. Young	4 days	++	½ gram ..	—
Maimah ..	4.6.26	Nsawam	16	"	—	++	Solid on boiling ..	Lime casts.
Yao Braimah ..	18.6.26	Asamankese	25	Dr. Byrne	6 days	—	—	—
Fonto ..	21.6.26	Saltpond	19	Dr. Duff	4½ days	—	++	—
Paul Curchod (French)	3.7.26	Accra ? Akuse	23	Dr. Young	3½ days	++	1.5 gram ..	—
Kwaku Adjpong ..	10.7.26	Asamankese	—	Dr. Byrne	6 days	+	Complete suppression	Lime casts.
Darkwa ..	16.7.26	Accra ..	26	Dr. Young	4-5 days	+	—	—
Grandcess (Kroo) ..	16.7.26	Accra ..	27	Dr. Young	4 days	—	+	—
Adjei ..	20.7.26	Accra Akuse	32	Dr. Young	4½ days	++	2/3 solid on boiling	Ante-mortem staph. infection.
Kobina Antwi ..	19.8.26	Asamankese	40	Dr. Byrne	5 days	+	Solid on boiling ..	—
Akua Bornoh ..	7.9.26	Asamankese	—	Dr. Walcott	8 days	—	6 grams per litre ..	Lime casts.
A.C.Hollis (European)	1.12.26	Accra ? Akuse	73	Dr. Mahaffy	4 days	++	Suppression marked	—
Kofi Atiobi ..	31.1.27	Suhum	91	Dr. Walcott	4 days	—	1/6 solid on boiling	—
Thomas Lartey ..	9.2.27	Suhum	96	Dr. Mackay	12 days	—	No specimen obtained	—
Peter Chadrawi (Syrian)	31.3.27	Accra ..	105	"	4-5 days	++	4 grams per litre ½ solid on boiling ..	—
				Dr. Young		++	1/5 solid on boiling ..	
				Dr. Robinson		++		

The two post-mortems 25 and of 10.7.26 are underlined because it was the histological examination of the tissues from these two cases which led to the discovery of the yellow fever epidemic in Asamankese. Tissues from all these cases are available for any one who desires to study them.

It should be remarked here that the Rockefeller Commission have made a complete report of their work. This report does not pretend to be a complete survey of yellow fever in the Gold Coast for the year 1926-27 but is a report of the work done by the Research Institute in connection with yellow fever.

The Asamankese Epidemic.—During May and early June Mr. Daltry, District Commissioner, had information that more than the normal number of deaths were occurring in Asamankese but no definite information as to the nature of the malady was forthcoming.

Fortunately, while stopping in Asamankese a death occurred and Mr. Daltry promptly had the body sent to Nsawam to be post-mortemed. Dr. Byrne, Medical Officer, Nsawam, made the post-mortem and forwarded the tissues. The only history obtained was that deceased was an Asamankese man, had been ill 6 days and had yellow eyes.

The tissues were 22 hours old when fixed, and as the corpse had made a journey of about 30 miles in the afternoon sun they were not at all easy to study. However, from careful study the conclusion seemed warranted that the cause of death was yellow fever.

On the 10th of July another body from Asamankese was post-mortemed at Nsawam by Dr. Byrne and the tissues forwarded.

Dr. Byrne suggested Yellow Fever was the cause of death in this case. The tissues did not show such advanced post-mortem changes and it was not difficult to express a definite opinion that Yellow Fever was the cause of death. The history was one of 6 days illness, fever, and jaundice. There were petechiae on the lungs P.M.

Dr. Muller agreed as to the diagnosis and later this diagnosis was confirmed from Lagos where tissues had been sent.

It is only fit and proper here to commend both Mr. Daltry and Dr. Byrne for their prompt action in both cases.

Discussing the matter with Dr. Walcott it was considered advisable that he should proceed to Asamankese and see what the actual state of affairs was. On his return he produced sufficient evidence to show that there was probably a big epidemic of yellow fever in existence in Asamankese.

Asamankese is a purely native town of about 4,840 inhabitants and 800 houses or compounds. It is only some 15-20 miles from the diamond fields, 29 miles from Nsawam, and is also a large trading centre. Consequently there is a constant coming and going of motor lorries and also of the inhabitants. It was naturally a spot from which natives in the incubation period of the disease could easily depart and later infect other communities.

As the political atmosphere was not good on account of "Chief Palaver," it required a good deal of patience and tact to find out the actual state of affairs and obtain information and see patients. By making friends judiciously and treating all and sundry, especially yaws cases with N.A.B., the confidence of the people was finally won, but never to the extent of obtaining permission to make post-mortem examinations. Towards the end of the epidemic two post-mortem examinations were made in spite of protest and after that no deaths were ever reported.

Personally, I saw on my

1st visit on July 14th 2 definite cases.

2nd visit on July 28th 5 new definite cases 10 suspicious — 2 indefinite.

3rd visit on August 3rd 12 new definite cases (2 deaths among the 5 seen on 28-7-26).

4th visit on August 15th 5 new definite cases (mild).

Actually during this period the Yellow Fever Commission saw 50 definite cases. Of these 8 were fatal—14 severe—14 moderately severe and 14 mild. These cases consisted of 35 males and 15 females and their ages ranged from 8 years to 50 years.

Of the deaths 6 were males and 2 females.

The death rate in those suffering from the disease is therefore 16 per cent.

From information carefully collected and sifted by the Commission it would appear that from May to August, 25 per cent of the population suffered. The number of deaths was in the region of 150 which gives a percentage death rate of $12\frac{1}{2}$ per cent for the patients and 3 per cent for the whole population.

The *Stegomyia fasciata* (*Aedes aegypti*) index for the compounds was 80%. The drinking water was usually stored in concrete tanks, over the opening of which $\frac{1}{2}$ " mesh wire netting was cemented.

In each compound there was always one room of which the owner had lost the key (!). This was really a juju room.

It is doubtful if they realised that the juju was in reality the mosquito which was hatched in the liquid messes given to pacify the deities within the room.

The average duration of the illness was 12 days. Deaths occurred as early as 4 days and as late as 15 days.

The symptoms were very definite.

A man would be working when he suddenly felt ill with fever, backache intense headache usually frontal. The suddenness of the attack was characteristic the patient usually being able to state the actual time he first felt ill. If examined within a few hours the temperature was round about 101° F and the pulse usually over 100.

As the case progressed anorexia, slow pulse, jaundice, epigastric tenderness and bile stained urine loaded with albumen and yellow granular casts were soon in evidence.

Curiously enough it was not till the 30th of July, that black vomit was first seen, although there was verbal evidence it occurred. The tongue was usually small, pointed with red tip and edges and a white to brown fur. Only in the severe cases were gum hæmorrhages seen. The jaundice in yellow fever may possibly vary in colour according to the colour vision of the observer but to me the early jaundice always appeared a green yellow. If the patient survived a severe attack, the jaundice changed to a deep golden yellow. This later jaundice was possibly mainly obstructive due to damaged liver now undergoing repair.

In the babies this green yellow jaundice was suggestive when compared to the dirty yellow of malarial origin.

Possibly the most definite symptom is the albuminuria.

This varied in amounts of from small quantities to 20 grams per litre per day. In many cases the tube of urine boiled solid and a half solid tube was a common occurrence. In fact it may be said that if, in the absence of other obvious causes, a test tube of urine boils one-sixth solid suspect yellow fever and if $\frac{1}{3}$ solid then yellow fever is certain.

Leucocytic counts were of no value. Polymorphonuclear counts varied from 20-96 per cent. Patients, who were to recover, or were convalescing, often had a characteristic heart beat, viz, the beat was irregularly rhythmical and slow. Some cases were still jaundiced 21 days after the illness had commenced. Babies and many young children appear to be only slightly affected by the disease; and it seems doubtful if there is sufficient evidence to show that an attack gives them a life-long immunity. Such infants were found in compounds where actual cases of yellow fever were occurring. In one compound, during the same period I saw 1 fatal case, 1 severe, 1 mild case and a baby of 9 months whom I considered as suffering from yellow fever.

Technique adopted for the isolation of possible infecting organism:—

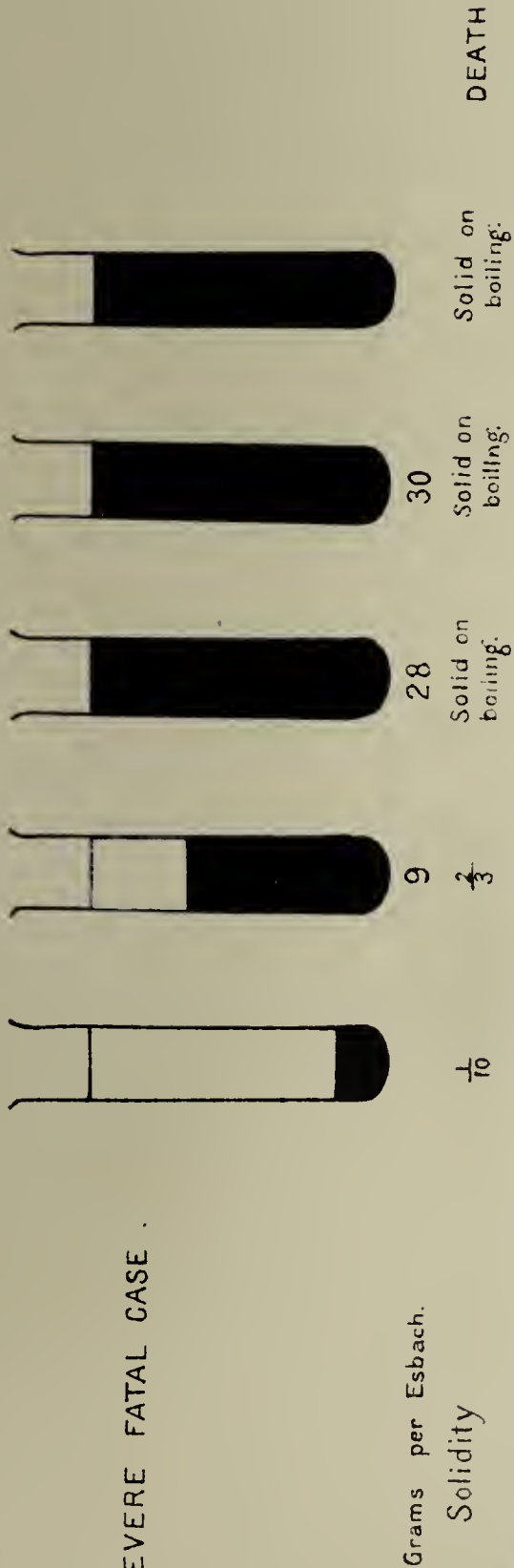
From every case seen within the first 3 or 4 days blood was taken to inoculate tubes of Noguchi's leptospiral medium. These tubes were forwarded to Accra and in many cases to Lagos as well. Dr. Muller and Kligler were responsible for this work. In no case was a leptospira seen or cultivated. When Muller and Kligler left here to return to Lagos they took all these cultures with them to resow and re-examine. The result was the same i.e. entirely negative. Guinea pigs of the necessary size and age were inoculated from the early cases and from culture tubes. Most of the animals survived unless some intercurrent affection killed them or they were killed for the sake of the experiment.

Blood films were also carefully examined to exclude relapsing fever and to make the necessary counts.

No of Days ill.

SEVERE FATAL CASE .

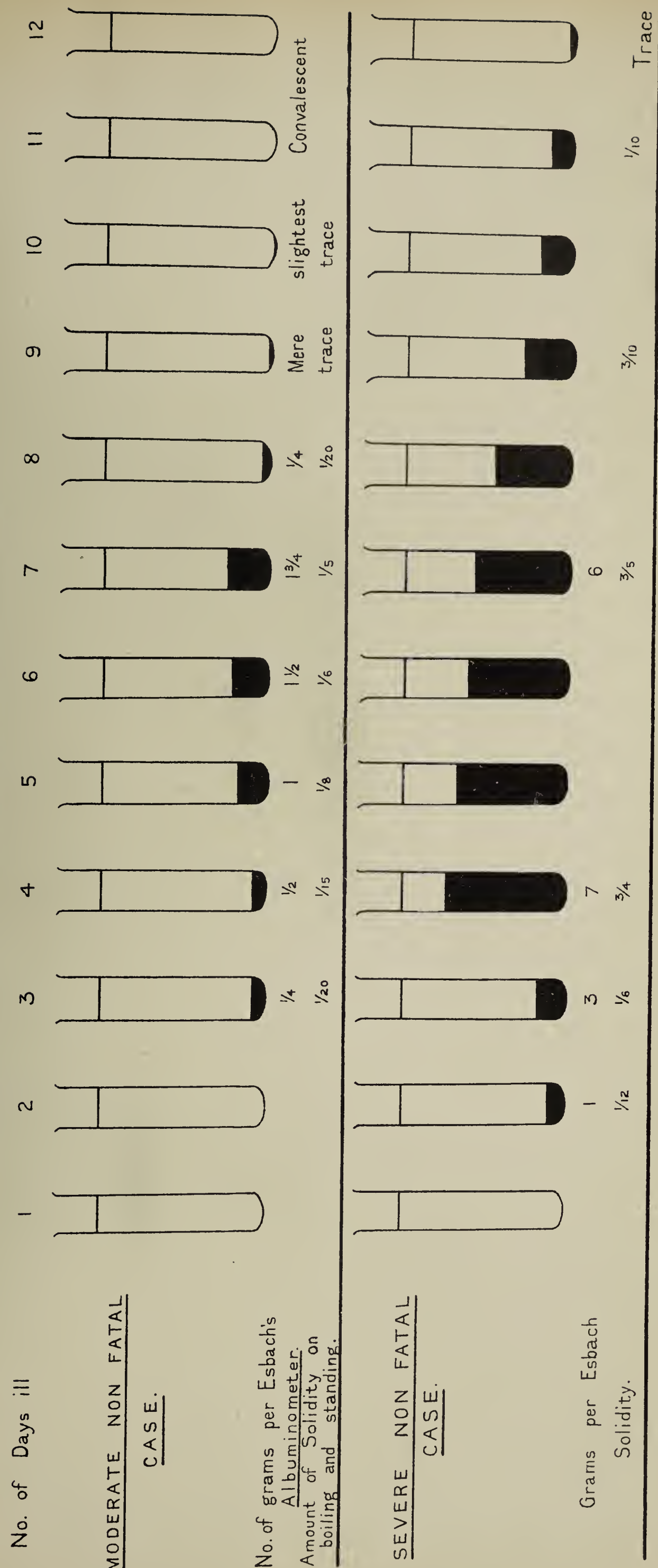
CASES SIMILAR TO THIS HAVE
RECOVERED IF THERE HAS BEEN NO
SUPPRESSION.



IT MUST BE NOTED THAT THE QUANTITY OF ALBUMINOUS
PRECIPITATE OBTAINED ON BOILING AND ADDING ACETIC ACID
AND STANDING DOES NOT BEAR A DISTINCT RELATIONSHIP TO
THE NUMBER OF GRAMS OBTAINED BY ESBACH'S ALBUMINOMETER.

EXAMPLES OF THE ALBUMINURIA IN YELLOW FEVER

SHOWN DIAGRAMMATICALLY



The urines were also examined by the dark ground microscope for leptospiræ. Briefly put it may be stated that from no yellow fever patient in Asamankese or elsewhere in the Gold Coast was any organism isolated in spite of the fact that many cases were seen as early as 6 hours after the commencement of the disease and in these cases the blood was inoculated into tubes and guinea pigs at least 3 times before the end of the 3rd day.

It should be mentioned here that the Mobile Laboratory was placed at the disposal of the Yellow Fever Commission during this epidemic and was of great value to them.

Pathology.—Unfortunately only four bodies were obtained from this epidemic for post-mortem confirmation of the diagnosis.

The first two post-mortem examinations were made at Nsawam by Dr. Byrne and the tissues forwarded were histologically examined here. The pathological picture especially in the 2nd case although somewhat spoilt by the age of the corpse so strongly suggested yellow fever, that the condition of Asamankese was promptly examined with the foregoing results. From the other two post-mortems fresh tissues were obtained and the histological study absolutely confirmed the diagnosis.

From this epidemic the following conclusions may be drawn.

1. Yellow Fever is not necessarily a disease confined to Coast Towns. The idea that it was so may have arisen because in the olden days transport was not available and so the infection of new areas was not easily achieved.
2. The Kroo people are not essential for an epidemic.
3. Native women contract the disease and can die from it.
4. Babies appear to suffer from yellow fever in a mild form and possibly do not obtain a lifelong immunity unless it is argued that those adults who suffered from the disease had never had it and those that did not, had had it in their infancy. This point wants elucidation.
5. *Stegomyia fasciata* (*Aedes aegypti*) was present in 80 per cent of the compounds of the town.
6. No organism was isolated to account for the disease, neither, did guinea pigs die when inoculated with infective (?) blood.

There is one aspect of Yellow Fever which does not appear to have been specially noted, namely that it is a rather "intimate" disease. By that is meant that close association with natives or their compounds seems necessary for infection. European women are not by any means numerous on the West Coast yet, but it is noticeable that a white woman contracts the disease she is generally in close contact with natives e.g. missionaries and teachers. This only shows that the *Stegomyia* mosquito does not travel far, apparently more or less stopping where it pupates and this is certainly a reassuring fact for those who fear an epidemic.

There is nothing special to relate about the other cases. They were typically yellow fever. In three cases Hoffmann's lime casts were seen but such casts have been seen in cases which were not yellow fever.

Attached are the temperatures of several guinea pigs which were inoculated with 5 cc of blood taken 36 hours after the first complaint of illness, from a very acute European case, which succumbed to the disease on the 4th day. The guinea pigs all recovered and at no time was anything of the nature of a leptospira seen.

DAYS.		1	2	3	4	5	6	7	8	9	
CONTROL,		99.9	100	99.9	100	100	99.8	100	100	100	Normal.
G.P.	485	102.0	102.5	101.6	103	100	101	102.1	102.2	100.2	Normal.
G.P.	486	100.2	100.5	100.4	101.6	101.5	101.6	101.4	101	99.8	Normal.
G.P.	484	102.0	102.2	102.0	103.0	102.5	—Killed and blood inoculated into.				
G.P.	501	100.2	99.5	98.0	continuing normal.						
G.P.	502	101.6	101.0	99.6		”	”				
G.P.	503	101.8	100.6	99.4		”	”				

Each day blood samples from the guinea pigs were examined by the dark-ground microscope and found negative.

It would appear therefore (1) that the blood was not infective or (2) that the guinea pigs were not susceptible to the living virus.

The Suhum Epidemic.—Suhum is a relatively new “cocoa” town, situated on the main road between Accra and Kumasi, and is 43 miles from Accra, 20 miles north from Nsawam and 17 miles south from Kibi. It has a population about 3,000—4,000 and there is a very big motor lorry traffic.

Fortunately the outbreak of yellow fever was detected early, and for this Dr. Mackay deserves the credit.

On the 13th January, 1927, Dr. Mackay discovered in Suhum that there were many cases of fever and that deaths were occurring. On the 14th Dr. Walcott saw several sick but none were yellow fever. On the 20th the same thing happened but he received information from the Chief that a sickness was occurring that he, the Chief, had not seen for a long time, and that it was known as Yellow Fever.

The Sanitary headman, however, definitely stated that he had seen a case in the Chief's compound which had yellow eyes and black vomit, and also that the Chief's brother had yellow eyes but, of course, he was out of town.

From information gathered Dr. Mackay was able to make a report and from the descriptions given, there could be no doubt that amongst many of the complaints there also existed yellow fever,

From the 1st January to 23rd January 17 deaths had occurred, and the histories certainly suggested that eight were due to yellow fever.

On the 31st of January Dr. Mackay made a post-mortem on a body (not claimed) and forwarded the tissues. A histological examination showed the condition to be that of yellow fever. On the 7th of February Dr. Thompson and myself went to Suhum, taking Mobile Laboratory with us. We met Drs. Walcott and Mackay and saw two definite cases of yellow fever. (One ran away later and died in the bush). The Mobile Laboratory was left behind for Dr. Walcott's use.

On the 9th February another lot of tissues were sent for examination and were found to be definitely yellow fever.

On the 18th of February I again visited Suhum and saw seven genuine cases in various stages. *Stegomyia* mosquitoes were to be found in most compounds.

Early in February Dr. Watt started a vigorous anti-mosquito campaign, with the result that the epidemic was quickly under control, and so never reached the proportions that the Asamankese outbreak did.

Apart from yellow fever there was much sickness due to other diseases, pneumonia and intestinal troubles.

While at Suhum I made two post-mortem examinations but they showed no signs of yellow fever, one being pneumonia and the other being paratyphoid fever.

The epidemic is now practically finished, as this is being written. Dr. Walcott informs me he has seen 26 definite cases with five deaths.

In other respects what has been written about the Asamankese outbreak, in regard to bacteriology, etc. applies to the Suhum outbreak.

Leptospira Icteroides.—After working with so much material and obtaining a constantly negative result over a period of years one naturally asks, what is the status of the *Leptospira icteroides*, if such a distinct entity does exist.

1. Both Kligler and Muller have isolated a leptospira in South America, yet they fail entirely to do so here, having more facilities here than in S. America.

It may be asked if epidemic jaundice could be entirely ruled out in these S. American epidemics? Carbo Neboa (1) reports what he calls the first case of infectious jaundice, but is he correct?

2. Quite a number of the members of the W.A.M.S. have seen numerous yellow fever cases but at no time has one of them ever reported the discovery of a leptospira.

3. At present it has not yet been shown that epidemic jaundice exists in West Africa (British) neither have the rats been shown to harbour the parasite. Thus it can be safely asserted that the diagnosis of yellow fever in the Gold Coast is not being confused with that of epidemic jaundice.
4. Recently Theiller and Sellards (2) have indicated by Pfeiffer's reaction that *Leptospira icteroides* and *hæmorrhagiae* are apparently identical.
5. If this should be proved correct then it is possible to suggest that no leptospira has been found in our yellow fever cases because there is no epidemic jaundice to confuse the issue.
6. Pathologically Hoffmann of Havana (3) and others have shown that the lesions of experimental Icteroides infection are in no way different to those of experimental Ictero-hæmorrhagica infection. Wamstrom (Ruth) (4) has also confirmed this and has shown that the leptospira can be demonstrated easily in all the usual tissues. Yet in the Gold Coast no leptospira has ever been found in yellow fever issues nor in the guinea pigs inoculated from patients in the infective period.
7. It may therefore be reasonably asked "Is the cause of yellow fever one of the ultramicroscopic viruses?" It must be remembered that for years the bacillus of hog cholera was supposed to cause the disease of that name in pigs until it was shown that the actual cause is an ultramicroscopic virus.
8. The present state of affairs on the Gold Coast is that the only leptospira known is the free-living water leptospira, which so far here has not been shown or made to have any pathogenic properties.
9. The only alternative in our present state of knowledge is that the yellow fever of West Africa is not the same as that of the New World, if *Leptospira icteroides* is accepted as the cause of the yellow fever of S. America.

The above remarks are made in order that those, who may have to work on the subject do not merely confine themselves to the discovery of a leptospira but also keep in view other possibilities.

I have to thank Professor Hoffmann of Cuba for having examined a large number of the tissues which I sent from yellow fever cases occurring this year.

He has confirmed my diagnosis and also found no leptospira.

The following list of cases in the Asamankese epidemic is appended for future reference and possible future work *e.g.*, to allow of obtaining convalescent sera, etc. I am indebted to the yellow fever Commission for this list.

References.—(1) Carbo Neboa.—An. de la Soc. Med-Quirurg. d. Guayas 1923, Vol. 4, No. 23.

(2) Relationship of *L. ictero-hæmorrhagica* and *L. icteroides* as determined by Pfeiffer phenomenon in Guinea pigs. Theiller and Sellards American Journal of Tropical Medicine November, 1926, page 383.

3. Hoffmann W. H. Histopathology of Yellow Fever—Journal of Tropical Medicine and Hygiene. September, 1st 1924—page 235.

4. Wamstrom Ruth, *Leptospira icteroides* in Guinea Pigs—Journal of Infectious Diseases, Vol. 34, page 110, 1924.

ASAMANKESE EPIDEMIC.

FATAL CASES.

Name.	Age.	Sex.	Native of.	Date of Onset.	Duration.
Yebuah Nelson ..	16	Male	Abetife ..	July 19	Died 15 days.
Kobina Antivi ..	26	"	Ashanti ..	Aug., 14	" 5 "
Kofi Ajuri ..	50	"	Asamankese	July, 29	" 6 "
Kwadro Asare ..	25	"	Wam ..	Aug., 9	" 4 "
Jane Akyen ..	30	Female	Asamankese	July 22	" 8 "
Yao Chebah ..	40	Male	"	" 29	" 10 "
Kojoe Amo ..	20	"	Kumasi ..	Aug., 19	" 10 "
Akuah Bornoh ..	21	Female	Akim ..	" 30	" 8 "
<i>Severe Cases.</i>					
Akuah Djaminah ..	22	Female	Asamankese	July 22	12th-15th day
Peter Asamoa ..	26	Male	" ..	Aug., 1	12th day approx.
D. J. Nkitia ..	18	"	Tafo ..	July 29	10th day "
Yao Bevo ..	21	"	Kumasi ..	Aug., 1	12th day.
Kwesi Ansah ..	12	"	Near C. Coast	July 26	11th-12th day.
Michæl Gyang ..	16	"	Asamankese	Aug., 15	Not known (disappeared).
Teni Bakia ..	14	Female	Accra	July 27	11th day.
Kwaku Ntimoah ..	28	Male	Asamankese	" 12	10th day.
Ebenizer Sintim ..	25	"	"	" 10	12th day approx.
Yaw Adejeikumi ..	27	"	"	" 18	10th day.
Kobina Puatee ..	14	"	"	Aug., 6	8th-9th day.
Abina Ababio ..	25	Female	"	" 2	12th day.
Yamoa Turkson ..	28	"	"	" 19	12th day.
Wm. Kwatchie ..	26	Male	?	" 25	14th day.
<i>Moderately severe cases.</i>					
John Amo ..	22	Male	Lagos ..	" 10	9th-10th day.
Anna Minachiwa ..	22	Female	Asamankese	July 23	7th day.
Kwamnata ..	10	Male	"	" 19	12th day $\frac{1}{2}$
Kobina Buati ..	18	"	"	" 25	9th day.
Joseph Wiradu ..	20	"	"	" 21	7th day.
Kwadoko ..	36	"	"	" 16	10th day.
Ebi Bobai ..	28	"	"	" 17	10th day.
Adjua Bota ..	18	Female	Asamankese	" 19	8th day.
Yao Ukuruma ..	17	Male	near "	Aug., 5	9th day.
Wao Tobah ..	20	"	"	July 29	7th day.
Abina Nitriwa ..	8	Female	"	Aug., 26	8th-9th day
Adjua Dukua ..	8	"	"	Sept., 1	5th day.
Kwami Asare ..	25	Male	Akwapim ..	Sept., 4	Lost on 3rd day.
Kwesi Adai ..	25	"	Asamankese	Aug., 16	9th day.
<i>Mild Cases.</i>					
Mercy Sekyere ..	25	Female	Koferidua ..	July 26	5th day.
Kwaku Adjepon ..	8	Male	Asamankese	Aug., 3	5th day.
Yao Nykwesi ..	9	"	"	July 28	6th day.
Te Adai ..	22	"	"	" 31	4th day.
Kofi Mensah ..	12	"	"	" 29	5th-6th day.
Adai Kwaku ..	10	"	Kwahu ..	Aug., 5	5th day.
Yaw Penah ..	30	Female	Asamankese	" 7	4th-5th day.
Adelaide Otah ..	22	"	near "	July 26	7th day.
Agutura Akyen ..	10	"	"	" 10	4th-5th day.
Kwesi Ababio ..	15	Male	"	" 20	8th day.
Emanuel Amponso ..	22	"	"	" 22	5th day.
Amah Tawah ..	50	Female	"	Aug., 4	9th day.
Kwaku Adjakwa ..	6	Male	"	" 4	7th day.
Kwesi Nyami ..	20	"	near "	July 24	8th day.

1. *Appendix*:—28-4-27.—Since completing this report the American Journal of Tropical Medicine of March, 1927, has come to hand.

In it Sellards, A.W. writes an article which, summarised, states that:—

1. Yellow Fever convalescent sera give negative Pfeiffer reactions with *Leptospira icteroides* and *L. icterohæmorrhagiæ*.
2. The identity of the two organisms is again confirmed.
3. That yellow fever is a disease confined to man and the mosquito and that laboratory animals are immune.

Our work, as far as we have gone, decidedly supports these views.

2. I have no definite facts to go on (it is more an intuition) but there appears to be a relationship between the meteorological conditions and the development of the yellow fever virus in the mosquito.

This idea might be worth proving or otherwise.

RELAPSING FEVER.

Towards the end of the yellow fever epidemic in Asamankese a report came from the Akwatia Diamond Mines that a death had occurred on the 3rd September in which jaundice was a symptom. Dr. Reid (W.A.M.S.) and Drs. Walcott and Hanson (Y.F.C.) made a post-mortem and took notes. On the 4th September another man was examined post-mortem. The tissues were sent to Accra with a note stating possibly yellow fever, but that the post-mortem picture was not exactly what would be expected. Fortunately spleen smears had been taken from the second case which showed in abundance the spironema of relapsing fever. Both patients were Northern Territory men and as such were not likely to be free from body lice. On the 10th September in Accra I made a post-mortem on a Northern Territory man, and found a condition, which although suggesting yellow fever was, in many respects, different, and it was not until Levaditi sections had been made and spironemata found that the real condition was known. The main centres were notified as to the possibilities of relapsing fever cases occurring, and since then several have been admitted to the Gold Coast Hospital, where, being quickly diagnosed, received prompt treatment with N.A.B. and soon recovered.

During October information was received that another outbreak had occurred in Esubonne, which is a camp village at No. 2 mine at Akwatia. Drs. Thompson, Walcott and myself visited the village and found two new cases, Northern Territory men. Dr. Walcott had seen four others some days previously. We used the dark-ground microscope, using the sun as the source of light, with excellent results, the spironemata being easily seen. Three cases were sent to Accra and made uneventful recovery.

The village of Akwatia was carefully inspected but no cases of relapsing fever were found. A few tubercular patients and many cases of yaws were seen, in fact quite a number of able bodied men and women were incapacitated by this disease and possibly 60 per cent of the whole population was affected by some stage. Body lice were found in the garments of all the Northern Territory men. It was suggested to the Mine Authorities that a new village should be built at Esubonne and the old one burnt with the lousy clothing. This was done with temporarily good results.

As relapsing fever may occur during a yellow fever epidemic it is necessary to have exact knowledge of the differences in the clinical, post-mortem and histological findings of these two diseases. For that reason is given below a summary of the post-mortem and histological pictures in detail of relapsing fever as seen here, and a differential diagnosis table, which may be of some use to others, who have not seen such diseases before.

Post-Mortem Appearances.

SUPERFICIAL.—Black or yellow stained vomit may be seen on the mouth. Eyes show jaundice of a deep golden yellow colour. Rigor mortis usually present.

THORAX.—Jaundice of costal cartilages usually marked.
Lungs show petechiæ—possibly some hæmorrhages in lung substance. Both bases are markedly congested, elsewhere crepitant. Pleural surfaces show petechiæ.

Heart Pericardium shows petechiæ increased bile—stained fluid. Heart muscles show petechiæ on both surfaces. Muscle jaundiced. Valves may be injected.

ABDOMEN.—*Stomach*—May contain blackish or yellow—stained material, but the mucous membrane, though injected does not show the marked petechiæ and injected condition seen in yellow fever, though a few ecchymotic patches may be seen.

Liver.—May best be described as being similar to that of yellow fever but not so marked. The lobules do not stand out so well and the cut surface does not appear so definitely fatty.

Spleen.—Much enlarged three times normal red pulpy the Malpighian bodies stand out.

Kidneys.—Enlarged capsule strips easily petechiæ may be present on surface. Cortex swollen pale. Pyramids distinct congested in areas.

Peritoneum.—Petechiæ may be visible.

Urine.—Specimen removed from bladder may show albumen and casts but the albumen is small in quantity compared to the amount seen in yellow fever urine.

HISTOLOGY.

Liver.—Hæmatoxylin and Eosin.—The general appearance is one of engorgement. As a result the liver columns become broken and the cells separated. However, there would appear to be no rupture of the linings of the sinusoids as no hæmorrhages are seen. The columns being broken, however, causes a rupture of the bile capillaries and these can be seen ending abruptly with freed bile at their ends. The liver cell is markedly granular but stains well as a rule—especially the nucleus. Some cells show four and others often two nuclei. Here and there a liver cell shows the protoplasm vacuolated and broken down. Such cells are not numerous and are more frequent in some lobules than others. Their distribution is general and not confined to any zone. There is no definite zonal necrosis as in yellow fever, though there may be small necrotic foci. The Kupffer cells can be seen separated from the adjoining liver cells. Small round cell infiltration is well marked in the portal areas

Eosinophilic cells are lacking.

In one case where fibrous tissue would normally be found there were present cells which did not appear to be lymphocytes. The cell was round—with a round nucleus and a small quantity of protoplasm and was larger than the usual lymphocyte. Hæmorrhages tend to occur in cases which have died after receiving N.A.B. treatment.

Muller and Osmic Acid.—Fat is present but not in quantity and is general throughout the lobule.

Levaditi.—Spironemata present in numbers.

Kidney.—Hæmatoxylin and Eosin—Congestion general. General granular changes of the cells everywhere. No hæmorrhages visible, casts very scanty.

Muller and Osmic Acid.—Fat very scanty, seen, when present, at three bases of the cells lining the tubules.

Levaditi.—Spironemata abundantly present.

Spleen.—Markedly congested and spironemata present in numbers. In some of the Malpighian bodies there are collections of endothelial cells.

DIFFERENTIAL DIAGNOSTIC TABLE.

	RELAPSING FEVER (<i>Lice borne</i>).	YELLOW FEVER.
PROSTRATION ..	Not so marked	Very marked.
TONGUE ..	Moist and coated brown with occasional black streaked dorsum	Small, pointed, bright red edges and tip with papillæ showing through—white coated dorsum.
JAUNDICE ..	May or may not be present; is of a golden yellow colour	Is present by the 3rd day and may be seen even as early as the 1st. There is a distinct tinge of green in the yellow.
URINE	Albumen, slight to very moderate amount is usually present	Albumen present by 2nd or 3rd day; if earlier—bad prognosis; soon becomes abundant, being anything from 1/6 to a solid tubeful when boiled.
SPIRONEMATA ..	Easily demonstrable by dark field microscope and confirmed by staining blood film	At present no organism has as yet been demonstrated.
LICE	Lice are always present	Lice need not be present and are usually absent.

PATHOLOGICAL.

It is not easy, if possible in some cases, to tell from the microscopic appearance of the various organs whether the condition is yellow fever or relapsing fever. The appearance, however, does not usually suggest definite yellow fever. In yellow fever the pathological change is more advanced and more destructive.

Black vomit may occur in relapsing fever and is usually present in yellow fever or is found post-mortem. In West Africa black vomit is merely an auxiliary sign and is found post-mortem, quite often, in septic conditions and in cases where there are advanced changes in liver causing back pressure.

HISTOLOGICAL.

	RELAPSING FEVER.	YELLOW FEVER.
LIVER	Only individual cells of small foci necrosed here and there. Eosinophilic liver cells absent. Congestion marked. Hæmorrhages scanty or nil Fatty degeneration slight. Spironemata numerous.	Zonal necrosis usually well marked. Present. Congestion slight (occasional exceptions). Hæmorrhages numerous. Marked. Spironemata absent.
KIDNEY ..	Cloudy and granular changes in cells. Casts scanty to nil. Hæmorrhages usually nil. Fat practically nil. Spironemata numerous.	Severe parenchymatous nephritis. Casts numerous—including lime casts. Hæmorrhages frequent. Fat present, especially at bases of tubular cells. Spironemata absent.
HEART	Fat absent unless in an acute toxic case.	Fat present, usually in quantity as fine minute droplets.

PLAGUE.

As a result of the Plague epidemic which apparently originated in Sekondi in March, 1924, and which finally ended in Kumasi about March, 1925, it was considered advisable to find out what could be done in the matter of manufacturing plague vaccine. Dr. Young carried out some preliminary experiments and found that quite a suitable vaccine could be produced without too much difficulty.

The matter was put to the Government who kindly voted the extra funds necessary for the work.

On his return from leave Dr. Burgess took over the work and in the course of his labours found that various details required fuller investigation. He therefore made a research into the question of a good potent and yet not too toxic plague vaccine.

His report follows.

At present 10,000 doses of vaccine, not more than three months old, are always available in our ice chest. (It was found that vaccine 6 months old showed a distinct loss of potency). If necessary 20,000 doses a month can be produced without undue interference with the other work.

Dr. Burgess in his paper to be published shortly in the *Journal of Hygiene* arrives at the following summary and conclusions.

SUMMARY.

1. Strains of *B. pestis*, kept in culture for 7 and 9 months, showed no loss of virulence.

2. Virulent strains, when subjected to passage through an immunized *Crice-tomys gambianus* (African pouched rat) suffer distinct loss of virulence for this species, and virulence is not regained in culture or on repeated passage through susceptible *C. gambianus*. The so-called avirulent plague bacillus, obtained in this way, appears to be a rough variant. It differs in microscopical appearance from the ordinary virulent forms, tending to the appearance of involution forms, which develop in salt media.

3. As regards immunizing properties:—

(a) Vaccine prepared from virulent strain gives considerable protection against infection with a virulent strain.

(b) Vaccine prepared from a virulent strain gives no protection against infection with a virulent strain.

(c) Vaccine prepared from an avirulent strain gives little or no protection against infection with a virulent strain.

4. Animals, which recover from infection with an avirulent strain, are immune to subsequent infection with a virulent strain.

CONCLUSIONS.

If the results obtained with pouched rats can be applied to man, the loss of virulence caused by passage through immune individuals would appear to be an important factor in determining the subsidence of an epidemic of plague. For, as immune individuals increase in number, the plague organism has a greater chance of becoming attenuated without losing its immunizing power, and thus is established a cycle antagonistic to the virulence of the organism.

But the killed avirulent organism has no immunizing power, and therefore it is of importance to avoid using it in the preparation of vaccine. It would appear that, for this purpose, one should not be too ready to discard a stock culture in favour of a body strain, without a thorough test of the virulence of the latter. This applies more particularly to fresh human strains. Plague patients are not always readily available and have often been vaccinated, and if a culture from a vaccinated case is used, the resulting vaccine is likely to be inefficient.

These statements are very interesting. For example recently I made some experiments in the hope of producing an avirulent strain and inoculated series of six vaccinated rats with heart blood from the previous one. It was found that the period of life was shorter instead of longer.

ERRATUM.

Page 60—Plague—Summary—Paragraphs 3 and 4 should read :—

3. “ As regards immunizing properties :—

- (a) Vaccine prepared from virulent strain gives considerable protection against infection with virulent strain.
- (b) Vaccine prepared from virulent strain gives no protection against infection with avirulent strain.
- (c) Vaccine prepared from avirulent gives little or no protection against infection with virulent strain.

4. Animals, which recover from infection with an avirulent strain, are immune to subsequent infection with virulent strain.”

As far as was known the vaccine was made from the same strain as used for inoculation and yet if Burgess is correct then an avirulent vaccine must have been used with a virulent inoculation or *vice versa*. It will thus be seen that it is very essential to be certain that the strain used for making a vaccine is truly virulent.

Dr. Burgess is still continuing his research.

Mr. Leeson has done very useful and loyal service in this work and both Dr. Burgess and myself are greatly indebted to him.

The following is Dr. Burgess's Report :—

PLAGUE VACCINE.

From December, 1925, to September, 1926, a number of experiments were carried out to determine the best method of preparation of plague vaccine and to test its efficiency. The more definite results have been given in a paper to be published in the *Journal of Hygiene*. These results are merely mentioned, and not described in full, in this report, but it has been considered necessary to give a full description of methods in both places.

METHODS.

Bacterial Strains.—Two strains of *B. pestis*, were used both from human cases. One was provided by Dr. Connal, who obtained it at Lagos in December, 1925, and the other was obtained by Dr. Young at Sekondi in March, 1924.

In this description, cultures are distinguished by the letters S or L (Sekondi or Lagos) and a number, a new number (not usually consecutive) being allotted after each animal passage.

Culture Methods.—Media, prepared without salt, were always used. At first lemco-peptone medium was used, then Douglas medium and finally fresh-meat-extract-peptone medium. Growth was allowed to proceed at room temperature (21° to 31° C), except in the coldest weather, when the incubator jacket was filled with water at 30° C twice a day.

Cultures were obtained from dead animals by liver stab, after searing the organ. In the later experiments pure culture were usually obtained in this way.

Microscopic Methods.—Spleen films, made after death, were examined in all cases. They were usually stained with Giemsa's stains, which was preferred to Archibald's and the simple anilin stains. Films from the superficial and prevertebral lymph glands were also examined in many cases, but were less satisfactory than spleen films, as the bacilli in them were usually broken up and less certainly recognisable. In a very few cases, however, plague bacilli were detected in the prevertebral glands, when there were none in the spleen. To determine purity, cultures were stained by Gram's method, and also examined under dark ground illumination. The latter was very useful in detecting scanty contaminating motile organisms. A dark ground method, used in counting cultures and vaccines, is described below.

Experimental animal.—The animal chiefly used was *Cricetomys gambianus*, the pouched rat, which is now the commonest domestic rat of Accra. For the sake of comparison small numbers of guinea pigs, *R. rattus* and *R. norvegicus* were also tested.

Precautions against spread of infection.—The whole laboratory staff received two doses of Lister Institute plague vaccine at the start, and those actually working with plague material received another full dose three months later.

Experimental animals were housed in a concrete building and confined in wire cages kept on iron racks or in concrete wall cages.

Every rat on admission to the animal house was "defleaed" by dropping it into a tall glass cylinder containing 2 per cent lysol. where, after being ducked, it was allowed to tread water for a certain time. It was then taken out washed under the tap. *C. gambianus* was given two minutes in the bath and stood the treatment well, but other species were adversely affected, and *R. rattus* in particular often died in three or four hours without becoming dry. *R. rattus* and *R. decumanus*, therefore, were given only about half a minute in the bath. Experiments showed that the two minutes bath was quite effectual in killing all fleas. Trials with chloroform and Keating's powder were also made, but were unsuccessful. Rats unless infected immediately on admission received another lysol bath just before being infected. Guinea pigs were not put in the bath, as they did not harbour fleas.

As a further precaution against migration of fleas, animals, when infected, were at once placed in the "pool." This consisted of an eight-foot-square concrete tank, on the floor of the animal house, containing water, with a little kerosene added. If there were many animals under experiment, the cages were placed one on top of another, the lowest being an inch or two above the water level. This piling up of cages involved the risk of an animal getting infected from its neighbours. To minimize the effect if this, animals infected with different material were separated by an interval, so that only similarly infected ones had their cages in contact.

Animals were not removed from the "pool" until death or recovery had occurred and in either cases the cage with the animal inside, was immersed in a tank of lysol before the latter was handled.

Methods of observation and recording.— *C. gambianus* is very susceptible to plague infection, and as most specimens died even when vaccinated or infected with the so-called avirulent cultures, a simple statement of mortality would mean but little. The length of life after infection (survival period of an animal or killing time of a culture) was therefore considered in determining the virulence of cultures or protective value of vaccines, an arbitrary survival period being allotted to animals which recovered.

The virulence of a culture is regarded as being inversely proportional to the average survival period of a number of animals infected with it, a period of 408 hours (17 days) being allotted to animals which recover. The figure 408 was obtained as follows. Of all the *C. gambianus*, (351 in number) infected with plague, the one which lived longest and yet died of plague, lived 360 hours (15 days). Therefore, if an animal was still alive 360 hours after being infected, it is fair to regard it as having recovered. Forty eight hours was added as a margin, giving the figures 408.

In vaccine tests the measure of immunity conferred is obtained by taking the difference between the survival period of each vaccinated animal and the average survival period of the controls (unvaccinated infected animals). To animals which survive, a "difference" of 360 hours is allotted, this corresponding to a survival period of 408 hours, as 48 hours was the approximate average life of the controls ($360 + 48 = 408$). The average "difference" is then calculated, and the ratio of this to 360 (which would be the average difference if all the vaccinated animals recovered) gives the efficiency factor of the vaccine. Test I, below, may be referred to as an example.

The recording of the survival periods of course needed frequent inspection of the animals, but it was not possible to continue observation during the night. To adopt a uniform rule, therefore, animals, which appeared well at 9.30 p.m. and were found dead at 6 a.m. were regarded as having died at 3.30 or 4 a.m., whichever made a round number.

Observations on the virulence of B. Pestis

It was found that virulence was not affected by long cultivation (7 to 9 months) without animal passage, but was diminished by passage through a vaccinated animal. Experiments showing this are described in the paper awaiting publication in the Journal of Hygiene.

Strains thus attenuated by passage are known as "avirulent" strains and all the others as "virulent" strains. It is to be noted that the term "avirulent" is used in a comparative and not in an absolute sense. In fact the majority of animals infected with avirulent strains died.

C. gambianus proved to be very susceptible to inoculation with plague, there being no case of recovery, when unmodified cultures were used. During the period April to August, 1926, 142 specimens were infected by subcutaneous injection of virulent cultures and 139 died with an average survival period of 53 hours, two were killed 44 hours after infection and one died $3\frac{1}{2}$ hours after infection. Except the last all showed numerous *B. pestis* in spleen films.

As regards other animals the following were infected by hypodermic injection of pure virulent culture in the same period:—

7 guinea pigs, (bought locally)	..	All died with an average survival period of 106 hours.
16 <i>R. rattus</i> .		2 died with negative spleen films a few hours after ..infection, probably as the result of the lysol bath.
		12 died of plague.
		2 recovered.
<i>R. norvegicus</i>	—	2 died of plague.
		2 recovered.

Experiments prior to April are not considered here, because the results are somewhat confused, owing to the use of different methods of infection, to the premature killing of certain animals, and to the use in some cases of contaminated cultures. Prior to April the usual method of infection was by scarification with spleen juice of an animal recently dead of plague. It was thought that, in this way, virulence would be maintained at a high level, but the reverse proved to be the case for several *C. gambianus* recovered after infection and the average survival period was longer than in the case of hypodermic inoculation. Moreover cultures, made at autopsy by liver stab from scarified animals, were often contaminated, whereas in later experiments, in which infection was by hypodermic inoculation of pure culture, cultures obtained after death were rarely contaminated.

In infecting by means of pure culture it is unfortunate that a standard dose was not used, and it is believed that the poor results obtained in certain vaccine tests are due in part to the large doses of infecting culture employed.

The following experiment tends to show that variation in the size of the infecting dose is of some importance, although the result is not very striking. Twenty *C. gambianus* were infected with broth culture, 10 with a Douglas culture and 10 with a fresh meat extract culture. The cultures were two days old and contained approximately the same number of bacilli, viz. 150 to 160 million per cc (dark ground count). Graduated doses were prepared by successive five-fold dilution, and each dilution was tested on four animals, the volume of inoculum being 0.4 cc in each case. In the following table the numbers of bacilli injected, and the survival periods of the animals are given:—

Dose.	Survival Periods (hours).		
	Douglas Culture.	Fresh meat Culture.	Average.
62.5 million	41.60.	51.70.	55.5.
12.5 million.	41.43.	51.60.	48.8.
2.5 million.	60.60.	53.65.	59.5.
500 thousand.	55.89.	56.70.	68.0.
100 thousand.	55.113	56.60.	71.0.

As will be seen later, the vaccine test, which gave the best result, was the one in which the smallest infecting dose was given.

PREPARATION OF VACCINE.

Cultivation and emulsification.—The method finally adopted for the preparation of plague vaccine is as follows. The bacillus is grown in Roux flasks, on salt-free, fresh-meat-extract peptone medium solidified with 3 per cent agar. This is inoculated by flooding with 10 cc of a two-day broth culture introduced in a special way, described in the next section. Growth is allowed to proceed for four days at room temperature in the dark, the flooding of the surface being repeated daily. The emulsion is then made. The liquid remaining in the flask is first poured off into a large sterile test-tube, 5 cc of 6 per cent phenol in normal saline are poured into the flask and the growth is rubbed off the surface of the agar with a glass rod, a film being prepared for microscopic examination from the growth adhering to the rod. The emulsion thus prepared is poured into the test-tube, the flask rinsed out with 5 cc of sterile saline, and the washings poured into the test-tube. The films are then examined, and the contents of the test-tubes pooled, excluding any contaminated, 5cc of emulsion are removed for weighing as described under "Standardization". and the remainder poured into a large bottle and shaken on a mechanical shaker for half an hour. The emulsion is allowed to stand for 24 hours at room temperature, to sterilize it, and is then diluted with saline solution to bring the phenol content to 0.5 per cent. In calculating the dilution it is reckoned

that 0.5 cc of the 6 per cent phenol is lost in each flask, and that 2 cc are withdrawn in the specimen removed for weighing. When the weight of dried substance has been ascertained the emulsion is diluted with 0.5 per cent phenol saline until it contains 1.5 milligrams per cc.

There is nothing new in this method, but it was evolved after certain modifications which will now be described.

At first contaminations in the Roux flasks were frequent. To avoid them, a means of inoculating the flask, without removing the plug, was devised by Mr. F. Leeson, Laboratory Superintendent. The device, which may be called the L-tube is shown in Diagram 3.

It consists of a test-tube, bent to a right angle, with a small hole in the side near the bottom end. It is pushed through the plug of the flask in such a way that with the flask horizontal, the lower limb of the L-tube is horizontal inside the flask, the hole pointing upwards, and the upper limb vertical outside the flask. The L-tube is charged with 10 cc of broth and plugged, and the whole apparatus autoclaved

The broth in the L-tube is then inoculated with one drop of broth culture, and after two days growth the flask is flooded by simply holding it vertically, when the culture runs out of the L-tube through the lateral hole into the flask. The need for removing the large plug of the flask, with consequent in-rush of air, and for introducing a large quantity of culture with the flask open is thus avoided. The apparatus was effectual in preventing contaminations.

As to nutrient media, at first lemco peptone media was used, but growth on this was too slow, then Douglas medium, and later fresh meat extract peptone medium were tried. The most rapid growth was obtained with Douglas medium, but the fresh meat extract was almost equal in this respect. There was however, remarkable difference in the friability of the growth, for Douglas emulsion was always full of lumps, which no amount of shaking would break up, whereas the fresh meat culture readily formed a fine emulsion. Up to September, however, no vaccine, grown in fresh meat medium, had been tested on animals. All the vaccines, mentioned below, were grown either on lemco or Douglas medium.

Two other factors were found to favour the preparation of a fine emulsion *viz*, frequent flooding of the agar in the Roux flasks (*e.g.* every day, instead of on the first two days only), and the use of strong phenol (*e.g.* 6 per cent, instead of 0.75 per cent).

Standardization of vaccine.—Wright's method of counting was first tried, but was discarded, because very unsatisfactory films were obtained, owing, probably, to the presence of phenol.

The following method, in which dark field illumination is used, has proved fairly satisfactory. A drop of emulsion, diluted if necessary, is placed on a slide with a platinum loop, covered with a cover glass, without pressure, and sealed in with paraffin (M.P. 110°F) applied on a hot wire.

The preparation is taken observed with a dark field microscope, the eyepiece of which contains a diaphragm corresponding to a definite area of the object. In our experiments a Zeiss paraboloid illuminator, a 1/7" immersion objective and a K. x 15 ocular have been used. A metal diaphragm with a 2mm square aperture is dropped into the ocular and, with a tube length adjusted (about 200 mm) to give an initial magnification of 62.5, the area of the object visible is roughly 1,000 square microns. The suspended bacilli are then counted in about 20 fields, carefully focussing through the thickness of the film, and the thickness of the film in each field is measured by focussing from the lower surface of the cover glass down to the upper surface of the slide and observing the travel of the fine adjustment on the milled head. The real thickness is less than the apparent thickness on account of the difference between the refractive indices of oil and water, and is obtained by multiplying the apparent

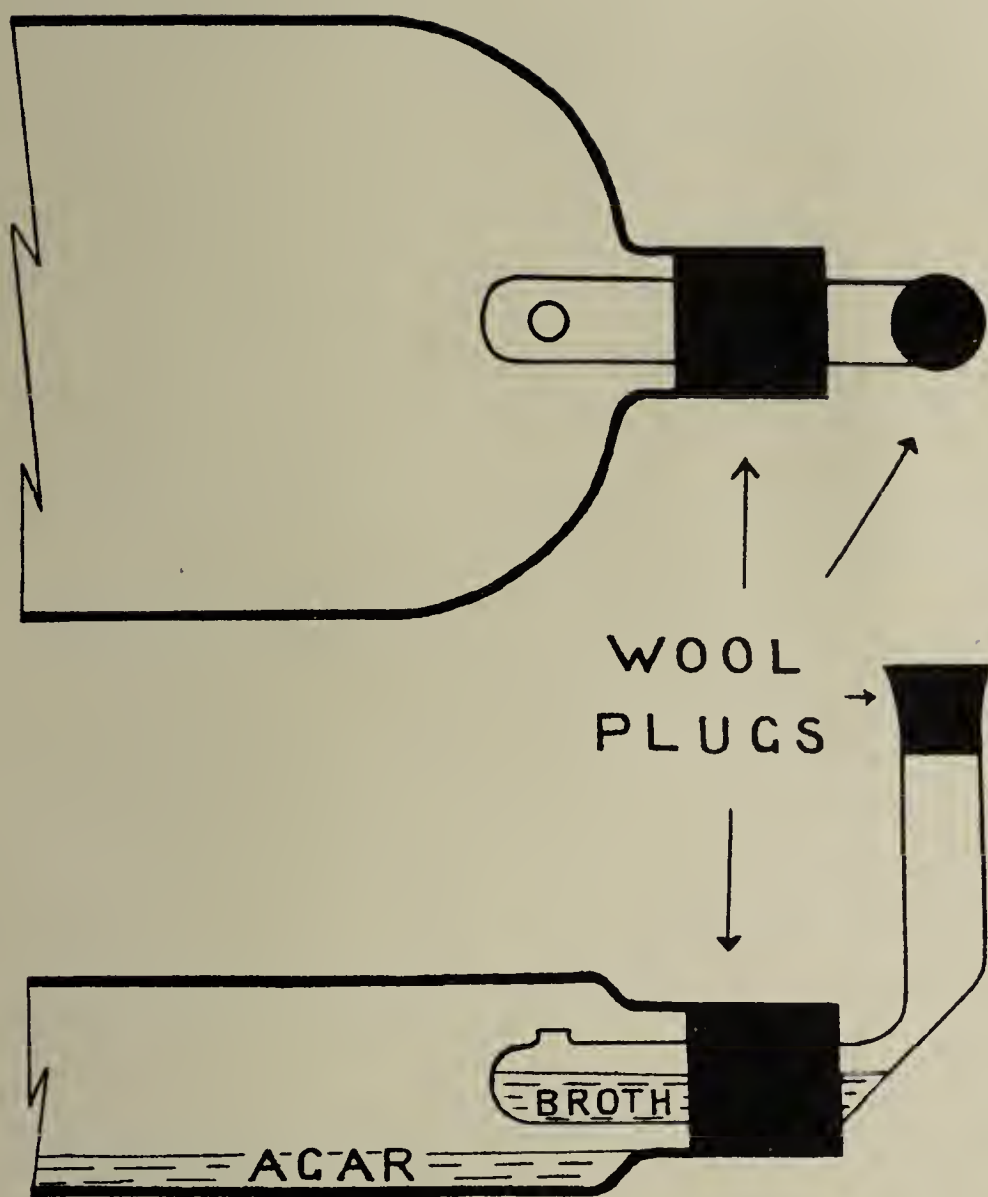
thickness by their ratio, $\frac{1.33}{1.51} = 0.88$. Thus if N is the number of bacilli counted

and D the aggregate apparent thickness of all the fields in microns :—

1000 x 0.88 x D cub. microns contain N baccilli.

1 cub. micron contains $\frac{N}{1000 \times 0.88 \times D}$

1000 x 0.88 x D bacilli.





But 1 cc = 10^{12} cub. microns.

$$\begin{aligned} \text{Therefore 1 cc contains } & \frac{10^{12} \times N}{1000 \times 0.88 \times D} \text{ bacilli.} \\ & = \frac{10^9 \times N}{0.88 \times D} \\ & = \frac{1000 \times N}{0.88 \times D} \text{ million bacilli} \end{aligned}$$

The concentrated emulsion obtained from a Roux flask requires diluting about 40 times. In making the dilution, 0.5 cc of strong emulsion is mixed with 19.5 cc of normal saline. This large quantity is taken, because it was found that dilution made with small pipettes, such as those of the hæmocytometer, gave irregular counts which were usually lower than those obtained with larger volumes.

The discrepancy was supposed to be due to the adhesion of bacilli to the glass surfaces, the effect of which would be minimised by using large volumes.

The method is also useful for counting broth cultures, and these require no dilution.

The dark field count was eventually replaced by a method based on the estimation of quantity of dried bacterial substance, because it was thought that the latter would give more consistent results in the hands of different workers. In this method 5 cc of strong emulsion are placed in a weighed tube and spun for half an hour on an electric centrifuge, the fluid is pipetted off and the tube exhausted by means of a motor driven Geryk pump and at the same time heated in a water bath for about an hour, the temperature being gradually raised to 80° to 85°C. After weighing, completion of the drying process is checked by keeping the tube in an oven at 50°C for 24 hours, which should cause no further loss of weight.

The method is perhaps unnecessarily complicated, and is considered provisional. It may be noted that the dried substance is hygroscopic, and quickly gains weight if exposed to the air. This is probably due to the presence of phenol.

VACCINE TESTS.

A number of animal tests were made to determine how far the protective value of vaccines depended on the method of preparation and on the particular strain of *B. pestis*, used.

Some interesting results were obtained with the so-called avirulent strains (*i.e.* those rendered relatively avirulent by passage through vaccinated animals).

As anticipated, a vaccine made from avirulent strain gave scarcely any protection against infection with virulent strains.

But in the converse experiment, *i.e.* vaccine from virulent strain and infection with avirulent strain, the result was unexpected.

It was hoped that the vaccine would protect against the avirulent strain, the administration of which would still further increase immunity. It was found, that vaccination gave no protection against avirulent strain. It appeared, in fact, to have the reverse effect, the average survival period of the vaccinated animals being shorter than that of the controls. These results have been given in detail in the paper already referred to and are merely mentioned here.

There remain to be described a number of experiments, the chief object of which was to determine the effect of modifications in the methods of preparation of the vaccines.

In these only virulent cultures were used, both for vaccine and for infecting. All animals received two hypodermic doses of vaccine, *viz.* 0.5 cc and 1 cc, with an interval of 6 or 7 days. One cc of vaccine contained 3,000 million bacilli, or 1.5 milligram of dried bacterial substance, according to the method of standardization.

Control animals (*i.e.* unvaccinated ones) were always infected at the same time, and received the same infecting dose, as the test (vaccinated) animals. Infection was always by hypodermic injection of pure broth culture.

Some of the tests, given below, consist of experiments made on different days, and therefore need one or more series of controls. On the other hand individual controls sometimes apply to more than one test. It will therefore be convenient to give a list of the controls first :—

CONTROL I.

14th April, 1926.

5 *C. gambianus* infected.

Dose, 100 million bacilli (a mixture of two cultures, one from a guinea pig and the other from a *C. gambianus*)

Survival periods = 37, 42, 42, 49, 60 hours.

Average S.P. = 46 hours.

CONTROL II.

16th April.

3 *C. gambianus* infected.

Dose, 0.4 cc of a 2-day culture.

S.P. = 34, 42, 51 hours.

Average S.P. = 42 hours.

CONTROL III.

19th April.

5 *C. gambianus* infected.

Dose, 20 million bacilli.

S.P. = 42, 57, 70 hours.

Average S.P. = 57 hours.

CONTROL IV.

21st April.

3 *C. gambianus* infected.

Dose, 0.4 cc of a 2-day culture.

S.P. = 28, 36, 54 hours.

Average S.P. = 39 hours.

CONTROL V.

6th May.

6 *C. gambianus* infected.

Dose, 0.4 cc of a 2-day culture.

S.P. = 36, 36, 36, 44, 44, 50 hours.

Average S.P. = 41 hours.

CONTROL VI.

11th June.

8 *C. gambianus* infected.

Dose, 0.2 cc of a 3-day culture.

S.P. = 37, 46, 50, 52, 56, 60, 60 hours.

Average S.P. = 51 hours.

CONTROL VII.

11th August.

8 *C. gambianus* infected.

Dose, 0.1 cc of a 1-day culture.

S.P. = 42, 42, 49, 51, 51, 52, 58, 66 hours.

Average S.P. 51 = hours.

CONTROL VIII.

30th August.

8 *C. gambianus* infected.

Dose, 0.02 cc (one fiftieth) of a 2-day culture.

S.P.=47, 50, 52, 54, 57, 58, 65, 72 hours.

Average S.P.=57 hours.

GUINEA PIG CONTROL.

6th May, 1926.

2 Guinea pigs infected.

Dose, 0.4 cc of a 2-day culture, obtained from a *C. gambianus*.

S.P.=42, 68 hours.

Average S.P.=55 hours.

Details of certain vaccine tests will now be given. *C. gambianus* was the animal tested in all experiments, except one, when guinea pigs were used. All the vaccines were standardized by dark-ground count, except one (Test VIII), in which the weighing method was used. The dates of infection and the infecting dose may be found from the corresponding controls. In the tables "S" indicates that the animal recovered. These survivors were killed not less than 17 days after being infected. They were dissected and spleen films made, but in none were there any signs of plague.

Tests I to IV were designed to determine the effect of adding serum to the culture medium. Human serum, which was left over from Wassermann tests, was used. It was previously heated at 56°C for an hour. The remaining tests are concerned with the effect of sterilizing with phenol of different strengths, and of heating, and also include a test with an old imported vaccine and a guinea pig test.

TEST I.

Vaccine 12.

Grown on lemco-peptone-agar, from culture 17 L, 12 days ex a guinea pig, with S.P. of 127 hours.

10 cc human serum, previously heated to 56° C for one hour, added to Roux flask, when latter inoculated

Sterilized with 0.75 per cent phenol.

6 *C. gambianus* vaccinated.

None died during immunization.

The first four were infected 6 days, and the last two days after the second vaccination.

Controls I, IV and V were used.

S. P. Test Animals—66, 42, S, 66, S, 300 Hours.

S. P. Controls ..46, 46, 46, 39, 41, 41, —

Difference. ..20, 4, 360, 27, 360, 259, —

Average difference. $\frac{1,022}{6} = 170.5$.

Efficiency of vaccine $\frac{170.5 \times 100}{360} = 47$ per cent.

TEST II.

Vaccine 13.

Prepared in the same way as Vaccine 12, except that serum was omitted.

6 *C. gambianus* tested.

None died during immunization.

The first four were infected 6 days and the last two 21 days after the second vaccination.

Controls I and V were used.

S. P. Test Animals ..	..	48, S, 90, S, 108, 44 hours.
S. P. Controls ..	..	46, 46, 46, 46, 41, 41 —
Difference ..	..	2,360, 44, 360, 67, 3 —
Average difference ..	..	139.5.
Efficiency ..	..	39 per cent.

In Tests I and II the survivors were killed 22, 36, 22 and 22 hours after being infected.

TEST III.

Vaccine 18.

Grown from Culture 4L, 14 weeks ex guinea pig, with S.P. of 96 hours.

Prepared in the same way as Vaccine 12. Serum added.

8 *C. gambianus* vaccinated.

None died during immunization.

The first six were infected 6 days and the last two 21 days after the second vaccination.

Controls I, IV and V were used.

S. P. Test Animals ..	..	60, S, 148, 70, 78, S, 46, 78, hours.
S. P. Controls ..	..	46, 46, 46, 46, 39, 39, 41, 41, —
Difference ..	..	14, 360, 102, 24, 39, 360, 5, 37 —
Average difference ..	..	118.
Efficiency ..	..	33 per cent

TEST IV.

Vaccine 19.

Prepared in the same way as Vaccine 18, but serum omitted.

8 *C. gambianus* vaccinated.

None died during immunization.

The first six infected 6 days and the last two 21 days after the second vaccination.

Controls as in Test III.

S. P. Test Animals	52, S, S, 55, 78, 72, 130, S. hours.
S. P. Controls ..	.. 46, 46, 46, 46, 39, 39, 41, 41, —
Difference ..	.. 6, 360, 360, 9, 39, 33, 89, 360 —
Average difference ..	.. 157.
Efficiency ..	.. 44 per cent.

In Tests III and IV the survivors were killed 22 days after the second vaccination, except the last, which was killed 36 days after.

As previously mentioned, these four tests were made in order to determine the effect of adding serum to the culture medium. Tests I and II were parallel, excepting the fourth member of Test I, which was added to replace an animal killed on account of severe ulceration. Tests III and IV were exactly parallel. As regards the effects of serum it will be seen that the two pairs of tests give conflicting results, but if they are compounded the following result is obtained :—

Efficiency of serum grown vaccine	.. ..	$\frac{1963 \times 100}{14 \times 360} = 39 \text{ per cent.}$
Efficiency, omitting serum	.. ..	$\frac{2,092 \times 100}{14 \times 360} = 40 \text{ per cent.}$

The efficiency factors are nearly identical, indicating that growing on serum had no effect on the protective power of the vaccine. Again if the proportion of animals, surviving, be taken as a criterion, the vaccine, prepared without serum, gives the better result, for with it there were five survivors, while with the serum-grown vaccine there were only four. These results were considered sufficient ground for discontinuing the use of serum, at any rate of human serum.

The following three parallel tests, V. VI and VII, were meant to show the effect of altering the strength of the phenol, used for sterilization, and the effect of heating in the presence of phenol.

TEST V.

Vaccine 26.

Grown on Douglas agar, from Culture 44 L, 2 days ex a *C. gambianus* with S. P of 50 hours.

Sterilized with 3 per cent phenol.

7 *C. gambianus* vaccinated.

None died during immunization.

Infection 14 days after 2nd vaccination.

Control VI used.

S. P. Test Animals	.. ..	152, 66, 51, 43, 47, 81, S hours
S. P. Controls	.. ..	51 —
Difference	.. ..	101, 15, 0, 8, 4, 30, 360 —
Efficiency	.. ..	20 per cent.

TEST VI.

Vaccine 27.

Prepared as Vaccine 26, except that 0.75 per cent, instead of 3 per cent phenol was used for sterilization.

7 *C. gambianus* vaccinated.

3 died during immunization.

Infection 14 days after 2nd vaccination.

Control VI used.

S. P. Test Animals	.. ..	47, 101, S, 50 hours.
S. P. Controls	.. ..	51 —
Difference	.. ..	4, 50, 360, 1
Efficiency	.. ..	28 per cent.

Weak phenol would thus appear to give the higher efficiency, but the difference is small, and the three premature deaths occurring in Test VI detract from the value of the experiment. They would have the effect of excluding the animals, most susceptible to plague toxin, from the test, and so giving an unduly high efficiency factor. It will be seen later, in Test VIII, that a good result was obtained with the use of 6 per cent phenol.

TEST VII.

Vaccine 28.

Prepared as Vaccine 27, except that the emulsion, containing 0.75 phenol, was heated at 60°C for one hour.

7 *C. gambianus* vaccinated.

None died during immunization.

Infection 14 days after the 2nd vaccination.

Control VI used.

S. P. Test Animals	..	122, 50, 52, 81, 75, 45,	114 hours.
S. P. Controls	..	51	—
Difference	..	71, 1, 1, 30, 24, 6,	63, —
Efficiency	..	7 per cent.	

This indicates that heating in the presence of phenol impairs the protective powers of the vaccine. The effect is in connection with other bacteria known, and as regards plague is mentioned by Rowland, as one of the points put forward by the German Plague Commission.

TEST VIII.

A short test was made of some imported vaccine obtained from the Sanitation Department. This had been kept in an ice chest for about eighteen months :—
Stock Vaccine

5 *C. gambianus* vaccinated.

One died during immunization.

Infection six days after the 2nd vaccination.

Control II used.

S.P. Test Animals	—	120 42, 84, 60	hours.
Control S.P.	—	42	—
Difference	—	78, 0, 42, 18	—
Efficiency	—	10 per cent.	

The poor result may be attributed to the age of the vaccine.

Vaccine 46.

Grown on Douglas agar from a culture 52 days ex a *C. gambianus* with S.P. of 37 hours.

Sterilized with 6 per cent phenol.

15 *C. gambianus* vaccinated.

Two died during immunization, and one died 57 hours after infection but showed no sign of plague and is not included in the table.

Infection 11 days after the second vaccination.

Control VIII used.

S.P. Test Animals :—

S, 95, 73, S, 134, S, S, 73, 112, 119, 119, S.

S.P. Controls—57.

Difference :—

360, 38, 16, 360, 77, 360, 360, 16, 55, 62, 62, 360.

Efficiency—49 per cent.

This was the best result obtained. It will be noted that the infecting dose was very small *viz* 0.02 cc of a 2-day broth culture.

GUINEA PIG TEST.

Vaccine 20.

Six guinea pigs were vaccinated. They were native ones and were purchased locally.

Two died during immunization.

Infection 21 days after 2nd vaccination.

"Guinea pig" control used.

S.P. Test Animals — 105,228,228, S. hours.

S.P. Controls — 55 —

Difference — 50,173,173,360 —

Efficiency — 52 per cent.

But perhaps it is scarcely justifiable to use the calculation to compare results obtained with different species of animals.

HEALTH CONDITIONS IN THE BEREKUM AND WAM DISTRICTS OF ASHANTI.

Sir William Simpson, because of certain information he received when in Kumasi, suggested that the above districts should be carefully examined. In his despatch No. 145 of 5th February, 1926, the Secretary of State requested that this work be done. Accordingly I proceeded there with Mr. Abbott, on 13th May, 1926. As I could not spend too much time away from headquarters—the Honourable Director of Medical and Sanitary Services, Dr. O'Dea, kindly put at my disposal Dr. Matthews.

With Dr. Matthews, I visited sixteen villages including Sunyani, Berekum, Wam and Pamu.

No unusual disease was discovered. Yaws was found to be common but that applies not only to Ashanti in general but to many districts throughout the Gold Coast.

It was found that roughly one in every three children had the disease and that ten per cent of the adult population suffered from tertiary yaws.

There can be no doubt that yaws in the Gold Coast is responsible for incapacitating a large proportion of the adult population. Quite apart from the fact that labour is thus made scarcer, there must be a large decrease in the natural resistance of the community towards other diseases.

There would appear to be every reason to start an anti-yaws campaign. This raises the question of expense.

In my opinion Novarsenobillion or similar type of drug is the best medicine to use. Sodium Bismuth Tartrate though cheap, is in my opinion not reliable in its action, is relatively painful to administer as compared to an intravenous preparation and I think the average yaws patient would be quite willing to pay the price of his N.A.B.

Dr. Hawe has been investigating the value of Sodium Bismuth Tartrate at the Gold Coast Hospital and he finds that while useful in primary yaws it is not satisfactory for the later lesions. Too many deep subcutaneous injections (it must *not* given intravenously) are required to make the Wassermann Reaction negative and the average patient will not therefore finish his course.

I understand Dr. Hawe is making a full report on the matter.

* * *

Dr. Matthews and Mr. Abbott continued their investigation for another month after I left. Dr. Matthews' conclusion was that the health of these communities was no worse and in some cases better than in other districts and that yaws was the prevalent disease.

His work is embodied in a very able report for the information of the Secretary of State, Medical Research Institute, No. 95/1926 of 25th June, 1926.

* * *

In September I proceeded to Salaga to discuss with Captain Beal, Principal Veterinary Officer, the question of trypanosomiasis.

The following suggestions were made as a result of our conference.

1. A complete survey of the Gold Coast to be undertaken. This should be done by a commission of at least 3 *i.e.*, a Pathologist, a Veterinary Officer and an Entomologist. (The latter is already present in the person of Mr. Pomeroy, Medical Entomologist). The Veterinary Officer chosen for the work should take the course at the London School of Tropical Medicine before coming out on the commission.

2. It is suggested that the survey should commence at the cattle quarantine stations and proceed southwards.

3. The survey will take note of 1. Human trypanosomiasis. 2. Cattle and wild fauna trypanosomiasis. 3. Possibilities of cattle rearing. 4. Physical and climatic conditions of the district. 5. Population and attitude of such.

4. There are few possible and suitable places at present where population, cattle, tsetse fly and trypanosomes all co-exist. One and most central is the area of the Wenchi and Kintampo districts but there appears to be no definite inclination on the part of the people to breed cattle there. Other districts are the Gambaga and Tume areas. In the meantime it is recommended that :—

1. Mr. Pomeroy, Medical Entomologist, assisted by Mr. Abbott, Laboratory Assistant, should cover the ground from Prang to Yeji and Yeji to Makongo obtaining an idea of the tsetse fly and their habits in that region and the percentage infection of the cattle.

2. Blood smears of all cattle slaughtered at Borku to be examined to obtain some idea of the infection of cattle before entering the Gold Coast.

* * *

Mr. Pomeroy started the work referred to on 1st November—having the assistance of Mr. Abbott until the end of December. His results are embodied in the Entomologist's report. *Vide* Appendix A.

* * *

POST-MORTEM EXAMINATIONS.

The number of post-mortem examinations made this year totals 102.

Typhoid fever	..	..	..	..	..	..	..	..	3
Yellow fever	..	..	..	..	..	..	..	..	17
Trypanosomiasis	..	..	..	..	..	..	..	..	1
Tuberculosis (generalised)	..	..	..	..	..	..	..	..	4
Tuberculosis (pulmonary)	..	..	..	..	..	..	..	..	2
Tubercular peritonitis	..	..	..	..	..	..	..	..	1
Relapsing fever	..	..	..	..	..	..	..	..	3
Malaria (cerebral case from steamer)	..	..	..	..	..	..	..	..	1
Acute lymphatic leukaemia (complicated by syphilis and fully described by Drs. HAWE and PATERSON in the Lancet January, 8, 1927)	..	..	..	..	..	..	..	..	1
Sarcoma with metastasis	..	..	..	..	..	..	..	..	1
Dysentery (bacillary or amoebic with septic absorption-the spleen enlarged in one case lay on the floor of the pelvic cavity)	..	..	..	..	..	..	..	..	6
Pneumonia (lobar)	..	..	..	..	..	..	..	..	2
Pneumonia (septic)	..	..	..	..	..	..	..	..	2
Pericarditis (pneumococcal)	..	..	..	..	..	..	..	..	1
Meningitis (pneumococcal)	..	..	..	..	..	..	..	..	2
Apoplectic cyst (hemiplegia)	..	..	..	..	..	..	..	..	1
Leptomeningitis (? syphilitic, Wass +)	..	..	..	..	..	..	..	..	1
Softening of Brain (child 15 years-hemiplegia, Wass + gold colloidal reaction luetic)	..	..	..	..	..	..	..	..	1
„ „ „ (insanity, Wass +)	..	..	..	..	..	..	..	..	1
„ „ „ (insanity, starvation)	..	..	..	..	..	..	..	..	1
Epilepsy	..	..	..	..	..	..	..	..	1
Parenchymatous nephritis	..	..	..	..	..	..	..	..	3
Chronic nephritis (uraemia, Wass +—)	..	..	..	..	..	..	..	..	4
Pyonephrosis (stricture urethra)	..	..	..	..	..	..	..	..	1
“ (one kidney) hydronephrosis (other) result of bilharzia infection of the bladder	..	..	..	..	..	..	..	..	1
Cardiac failure (senility 1—attempt to strangle himself)	..	..	..	..	..	..	..	..	2
Gumma (left ventricle heart)	..	..	..	..	..	..	..	..	1
Aortic aneurysm (case to be published in Trans. of Royal Society of T. M. and H.)	..	..	..	..	..	..	..	..	1
Aortic stenosis and atheromatous puckering	..	..	..	..	..	..	..	..	2
Cor bovinum (dilatation—myocarditis-fatty)	..	..	..	..	..	..	..	..	6
Cirrhosis of liver (gin)	..	..	..	..	..	..	..	..	1
Cirrhosis of liver (syphilitic)	..	..	..	..	..	..	..	..	1

Accidents, Etc.

Dislocation of neck (surf boat capsizing)	..	..	..	..	..	..	..	..	1
(plank accidents)	..	..	..	..	..	..	..	..	2
Gunshot wounds (hunting accidents)	..	..	..	..	..	..	..	..	3
Motor Car(fracture base of skull 1—rupture mesenteric vessels 1, rupture liver 1, fracture of spine 1, fracture base of skull and partial dislocation of neck due to jumping off car in motion	..	..	..	..	..	..	..	..	5
Lighting stroke	..	..	..	..	..	..	..	..	2
Anvil falling on child's chest and abdomen (haemorrhage and shock)	..	..	..	..	..	..	..	..	1
Strangulation (suicidal)	..	..	..	..	..	..	..	..	1
Wounds (knife stabbing complicated by pneumonia 1—axe wounds 1)	..	..	..	..	..	..	..	..	2
N. A. B. poisoning (given by unqualified native in deceased's house)	..	..	..	..	..	..	..	..	1
Postpartum hæmorrhage (adherent placenta)	..	..	..	..	..	..	..	..	1
Drowning	..	..	..	..	..	..	..	..	5
Sudden death due to intramuscular Sod. Bis Tartrate	..	..	..	..	..	..	..	..	1
Decomposed (unable to state cause of death)	..	..	..	..	..	..	..	..	1

The following case is given in full in note form as it is most unusual and even more remarkable in that the child lived in a compound where two very definite yellow fever cases had occurred. The provisional diagnosis was naturally yellow fever and superficially there are many resemblances. I understand from Dr. Muller that a case similar to this was published in German literature some time ago. Such cases must be rare.

NAME.—Ibrahim ; AGE.—14 months ; SEX.—Male ; TRIBE.—Hausa ;
RESIDENCE.—Nsawam. DATE OF DEATH.—2 a.m. 9th June, 1926. DATE OF
AUTOPSY.—2 p.m. 9th June, 1926.

No *rigor mortis* present. Poorly developed protuberant abdomen—no oedema—no signs of black vomit—sclerae mild icterus—rather yellower than green yellow. Was at out-patients on May 4th with diagnosis of diarrhoea. Tissues generally show slight jaundice.

On opening—a few petechiae on peritoneum.—Pericardial fluid increased to one ounce. Heart normal size—left ventricle firm right side flaccid—few petechiæ over right auricle. Muscle colour normal—consistency firm.

LUNGS :— Middle lobe right and both lower lobes showed petechiae up to 3 millimetres in size. Both lower lobes showed fairly solid broncho-pneumonia (red stage), patches also seen in middle and upper lobes. Congestions marked—but difficult to say if any hæmorrhages. Whitish areas 2 mms scattered over surface (?) Tubercle.

LIVER :— Increased 50 % in size allowing for larger relative size in children. Colour—yellowish brown with greenish tinge—lobules very plain—central veins dark surrounded by yellow area with outlines of lobules greenish black. Section—dry and oily—lobules stand out distinctly. Consistency firm.

GALL BLADDER :—Contains thin orange colour bile.

SPLEEN :— Three time normal size—no adhesions—a few large petechiae on surface—fairly firm—of dark chocolate colour.

STOMACH :—Size normal—contents four ounces of mucoid material of darkish aspect containing “fly specks”. Hæmorrhages marked over cardiac aspect—other pin point petechiae visible elsewhere.

KIDNEYS :—Left larger than right—enlarged a little. Capsules strip easily. Right kidney of nearly complete pale soap colour. Section likewise—pyramids and cortex difficult to define. Greasy fatty appearance—may be amyloid but does not cut as such. Congested over cut surface and lower pole.

Right Kidney showed more congestion—stellate veins distinct.

ABDOMEN :—Glands markedly enlarged adherent in a mass. Hæmorrhagic. On section—caseating and pus. Hæmorrhages into mesentery.

INTESTINE :—Hæmorrhagic infiltration of small gut—not confined to Peyer’s patches.

URINE :— Half oz. clear—slight cloud of albumen, granular bile—stained casts. 1—every 4 fields not centrifuged.

HISTOLOGY.

KIDNEY :—(H and E stain) Bowman’s capsules and linings appear normal. No congestion.

The convoluted tubules show the lining epithelium to be in a state of cloudy swelling—and perhaps fatty.

There is an increase in the cellular element between the tubules.

The intertubular area is increased between the straight tubules, due to increase in the cellular tissue which does not appear to be fibrous tissue.

Occasionally in the cortical area there are collections of cells of an epithelioid nature—no giant cell however. In the medullary area there are larger area of these cells, but no giant cells. These areas show cell necrosis in the centre. No haemorrhage.

(Ziehl Neelson's stain)

Tubercle bacilli exceedingly numerous in the cellular areas above mentioned and are found also scattered in the cells lining the tubules.

Staining by Methyl Violet for amyloid change negative.

Fine fat droplets in bases of cells lining convoluted and straight tubules.

LIVER :— (H and E) is a mass of holes with a few degenerated liver cells and fibrous reticulum. The fatty degeneration is practically complete of the whole lobule. Any liver cell left shows cloudy and granular changes. A few red cells appear to be free but there are no extensive hæmorrhages.

Malarial pigment + +. Dilated vessels containing red cells are numerous.

Tubercle bacilli are seen where there is an increase in the reticulum. There are no definite tubercular formations. Gross fat droplets everywhere throughout lobule.

LUNGS :— Show a broncho-pneumonic condition. Some consolidated areas show the air spaces filled with red blood cells and albuminous material, but generally the consolidation consists of epithelioid cells permeating everywhere—every now and then coming together to form collections. These would appear to be early tubercles. No giant cell system however. Some of these areas show a focal or central necrosis. Tubercle bacilli are scattered in great profusions throughout the whole tissue.

SPLEEN :— Show typical tubercular giant cell systems with turbercle bacilli in great numbers.

Malarial pigment very abundant.

RETROPERITONEAL GLAND :—No giant cell system visible. Scattered throughout the general lymph gland structure are areas of epithelioid cells showing central necrosis.

Tubercle bacilli in enormous numbers found in these areas and throughout the gland to a less degree.

DIAGNOSIS :—Tubercular septicaemia.

HISTOLOGICAL SECTIONS.

The total number of blocks of tissue cut this year is 428. This comprises the following tissues:—liver, 94; kidney, 101; spleen 51; lung, 40; heart, 30; glands 21; brains, 8; bladder, 3; Eye, 1; vaginal tissue, 5; intestine 4; duodenum 2; rectum 3; stomach, 1; skin (ulcers), 5; aorta, 1; pectoral muscle 1; pancreas, 3; tissue forearm, 1; penis, 2; placenta, 1; finger, 1; appendix, 2; ovary 1; testicle 1; malignant pustule 1; yaws, 1; total, 385.

Amongst interesting diagnoses made from these sections were:—

Yellow fever, relapsing fever, lymphatic leukaemia, leukaemia (dog), Hodgkin's disease, anthrax, pneumonia, cerebral malaria, typhoid fever, schistosomiasis of bladder, nutmeg liver, etc.,

It has been noticed that all livers tend to show a fair amount of fat. Fatty degeneration is very noticeable in chronic dysenteries. It is necessary to have a relative idea of fat in livers in dealing with yellow fever etc., One liver (taken from a case of broken neck and post-mortemmed one hour after death) showed quite a quantity of fat, (incidentally the kidney showed slight cloudy changes) so that it seems safe to assert that normally in the native liver, fat is not uncommon. Does the large carbohydrate diet have anything to do with this state of affairs?

Thirteen cases of yellow fever tissues were re-examined by Levaditi's method for possible leptospira but none were seen.

TUMOURS.—Cancers:

Rodent ulcer 1, adeno-carcinoma (breast) 1, squamous epithelioma (scrotum) 2.

Sarcomata:—

Melanotic sarcoma (eye) 2, large round cell sarcoma 2, small round cell sarcoma 7, myxo-sarcoma 1, spindle-cell sarcoma 1, fibro-sarcoma 1, sarcoid (Skin) 1. Odontoma 2.

Miscellaneous:—Branchial cyst 1, naevus 1, epulis (simple) 2, papilloma simple) 3, keloid (simple) 1, lipoma 1, fibroma 4, fibro-myoma 2, sebaceous cyst 1, peritoneal cyst 1, amyelinic neuroma 1, cystic adenoma thyroid 1, fibro adenoma breast 1, glandular mastitis 1, foreign body knee-spicule bone 1.

Total, 44.

FÆCES.

Total number examined	..	..	..	..	..	..	..	884
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Of these samples 397 were sent because the appearance of, and the clinical history suggested dysentery.

There was no evidence of <i>E. histolytica</i> and no dysenteric bacillus cultivated in	..	..	..	..	..	..	..	160
Flagellates only, found in	..	..	..	..	..	..	..	18
<i>Entamoeba histolytica</i> found in	..	..	..	..	..	..	..	56
<i>Balantidium coli</i>	..	..	..	..	..	..	..	2

In those stools which showed absence of <i>E. histolytica</i> and in which the microscopic appearance suggested the type to be bacillary dysentery only 19 showed a definite organism (full details later) in a total of	..	..	..	..	87
Examined for typhoid	..	..	..	..	13

In 59 apparently dysenteric stools (negative for the amoeba and bacillus) the following ova, etc., were found :—

Entamoeba coli	..	..	..	..	..	..	..	6
Ankylostoma	..	..	..	..	..	..	..	19
Ascaris	..	..	..	..	..	..	..	21
Ankylostoma and ascaris	..	..	..	..	..	..	..	7
Ascaris and trichuris	..	..	..	..	..	..	..	1
Asc, trich, and strongyloides larva 1, oxyuris bilharzia 1.								
Taenia saginata 1, hymenoepeis 1,	..	..	..	..	..	..	..	5
								395

487 stools were examined for various helminth ova.

Necator americana, alone, occurred	..	..	..	..	..	..	103 times.
Necator and Ascaris	..	..	..	..	..	..	21
Necator, ascaris and trichuris	..	..	..	..	..	..	10
Necator and trichuris	..	..	..	..	..	..	6
Necator, ascaris, trichuris and taenia	..	..	..	..	..	..	1
Necator and flagellates	..	..	..	..	..	..	9
Necator and bilharzia	..	..	..	..	..	..	1
Necator, strongyloides and flagellates	..	..	..	..	..	..	2
Necator, ascaris and taenia	..	..	..	..	..	..	1
Ascaris alone	..	..	..	..	..	..	96
Ascaris and trichuris	..	..	..	..	..	..	12
Ascaris and oxyuris	..	..	..	..	..	..	1
Ascaris and flagellates	..	..	..	..	..	..	5
Trichuris alone	..	..	..	..	..	..	10
Trichuris and flagellates	..	..	..	..	..	..	1
Strongyloides alone	..	..	..	..	..	..	7
Bilharzia alone	..	..	..	..	..	..	2
Taenia alone	..	..	..	..	..	..	10
Ascaris, trichuris, chilomastix, cercomonas and E. coli							
(in a Pathologist)	..	..	..	..	..	..	1
Negative	..	..	..	..	..	..	182
Examinations made for hydrobilirubin	..	..	..	..	..	..	6
Total							487

BACILLARY DYSENTERY.

During the year a total of 884 specimens of faeces have been examined of which 397 were sent from cases which suggested the disease to be dysentery. Of these 87 have been dysenteries in which *E. histolytica* has not been found, and the microscopic appearance suggested that *E. histolytica* was not the causative agent but rather that the type was bacillary.

These specimens were all plated out, therefore, care being taken that the specimens were quite fresh.

Dr. Thomson, since arrival, has worked very carefully on this material, also confirming the diagnosis of any positive bacillary cases obtained before he arrived and his full report follows :—

It is interesting to note that last year only three pure cultures of a dysenteric bacillus were obtained out of 46 cases which appeared bacillary in character, while this year 12 pure cultures have been obtained from 87 bacillary-like specimens.

The number of dysenteries where *E. histolytica* was the causative agent is 56. It will thus be seen that, even allowing for a few cases being missed, bacillary dysentery, as diagnosed by positive results, is not common. It will also be noticed that 6 organisms have been isolated which cannot be classified in any of the known groups. This investigation is still to be carried on.

In the Sekondi report it will be seen that *B dysenteriae*, Flexner was isolated 16 times and *B dysenteriae*, Shiga 4 times out of 40 cases of dysentery; *E. histolytica* been found in the other 20. Most of these bacillary cases occurred in a relatively short time suggesting a mild epidemic, whereas in Accra the cases occurred, more or less, sporadically.

It will also be noted that 6 cases gave reactions apparently similar to No. 619 of Dr. Thomson's series.

DR. THOMSON'S REPORT.

Non-lactose fermenting organisms isolated from cases of clinical dysentery in Accra.

Specimens of faeces from clinical dysentery cases in the Gold Coast, the Cantonments, the Asylum and Prisons Hospitals were examined microscopically and only those of a cellular nature and known to be freshly passed were plated out on MacConkey medium.

After isolation of colourless colonies, pure sub-cultures were obtained and each tested.—

1. For motility.

2. As regards its fermentation reactions, the sugars employed being glucose lactose, mannite, maltose and saccharose with Phenol Red as the indicator; incubation at 37°C being carried out for 3 weeks.

3. As regards its reaction to litmus milk, incubating at 37°C for 3 weeks.

4. For indol production after 4 to 6 days incubation.

5. If by the fermentation reactions it could be placed in a well known pathogenic group, for agglutination employing Dreyer's standard sera.

6. For gelatin liquifaction. Incubating for three weeks and cooling on ice.

Slow lactose fermenters, gelatin liquifiers and *B. faecalis alkaligenes* have been discarded from the series, the results of which are given below.

Culture.	Motility.	Glucose.	Lactose.	Mannite.	Maltose.	Dulcite.	Saccharose.	Litmus Milk.	Indol.	Gelatin.	Agglutination
64	—	A	—	A	—	—	—	Alk.	—	—	Flex. Y 1-800.
240	—	A	—	—	—	—	—	Alk.	—	—	Y in 1-1875.
403	—	A	—	A	—	—	—	Alk.	—	—	X in 1-1875.
497	—	A	—	A	A	—	—	Alk.	—	—	W, 1 in 500.
596	—	A	—	A	A	—	—	Alk.	—	—	X, 1 in 250
618	—	A	—	—	—	—	—	A tr.	—	—	Y, 1 in 250.
619	—	AG	—	AG	AG	—	A 15th day.	A	+	—	X, 1 in 250.
685	—	A	—	—	—	—	—	A tr.	+	—	Shiga, neg. Flex, neg.
738	+	AG	—	—	—	—	A 15th day.	A C	+	—	Shiga, 1 in 640.
740	—	AG	—	—	—	—	—	A-Alk.	—	—	—
741	—	A	—	AG	AG	AG	—	A tr.	—	—	Shiga, 1 in 300.
745	—	AG	—	AG	AG	AG	A G	A-Alk.	+	—	Para A. and B. Neg.
746	+	AG	—	AG	AG	AG	—	A-Alk.	—	—	—
and 751	—	A	—	A	—	—	A 9th day.	A-Alk.	+	—	—
757	—	A	—	—	A 15th day.	—	—	—	+	—	—
778	—	A	—	—	—	—	—	Alk.	+	—	Y, 1 in 800.
(902)	—	A	—	A	—	—	—	—	—	—	—
(907)	—	A	—	—	—	—	—	—	—	—	—
906	—	A	—	—	—	—	—	A tr.	+	—	—

Cultures 64, 240, 403, 497, 596, 902, and 907 are definitely *B. dysenteriae*, Flexner.

Cultures 685, and 741 are definitely *B. dysenteriae*, Shiga.

Cultures 618 and 906 appear to be Schmetz bacillus.

Culture 757 appears to be *B. dysenteriae*, Strong.

Cultures 746 and 751 appear to be inagglutinable paratyphoids.

The remainder fall under the heading of unknown organisms.

Considering the fact that the year 1926-1927 was very dry in Accra, during which period no epidemic occurred, it is interesting to note the unexpected variety of the strains of *B. dysenteriae* isolated.

COMPLEMENT DEVIATION TESTS.

This was attempted with 5 samples of blood from patients supposed to have ilharzia infection. The antigen used was made from liver flukes.

Two sera showed partial inhibition of hæmolysis and 3 complete hæmolysis. Clinically 3 were chronic cases and 2 early cases.

Wassermann and Sachs Georgi Reactions.—The same procedure was adopted as reported in previous Annual Reports, *i.e.*, Wass. Reaction as described in the Medical Research pamphlet, except that in testing the complement values of the guinea pig serum we make a larger number of dilutions between the same points and thus get greater precision in the results.

The Sachs Georgi method is that worked out by H. Ferguson Watson (*Journal of Pathology and Bacteriology*, Volume XXVIII, No. 2, page 171).

Wass Reactions.

Wass +	..	..	..	..	..	..	93
Wass ++	..	..		..	..	..	586
Negative	..	..	..	..	..	..	534
							1,213

Sachs Georgi.

+	..	..	..	..	..	..	48
++	..	..	..	..	..	..	95
+++	..	..	..	..	..	..	112
++++	..	..	..	..	..	..	128
+++++	..	..	..	..	..	..	46
++++++	..	..	..	..	..	..	42
Negative	..	..	..	..	..	..	318
							789

From figures obtained from *consecutive* cases occurring during the last two years a comparison has been made of 1,000 sera tested by the Wass. Reaction and the Sachs Georgi Reaction.

The results are shown below.

Experience has shown us that a Wass + should equal Sachs Georgi ++ up to Sachs Georgi +++ while a Wass ++ should be Sachs Georgi +++ to S.G. +++++.

Thus it will be seen that 831 are in complete agreement.

Many of the sera are tested during the period of treatment and it is noticed that the S.G. tends to show a positive when the Wass. May show a negative and this probably explains most of the other figures which do not exactly tally.

Wass	..	..	S.G.	..	..	Totals.
—			—			372
—			+			3
—			++			11
—			+++			3
—			++++			3
—			+++++			1
—			+++++			3
+			—			4
+			+			5
+			++			5
+			+++			1
+			++++			2
+			—			15
+			+			17
+			++			43
+			+++			38
+			++++			32
+			+++++			5
+			+++++			5
++			—			4
++			+			11
++			++			36
++			+++			81
++			++++			136
++			+++++			81
++			+++++			81
++			—++++			1
++			—++—			1

1,000

Of this year's sera 190 were from cases diagnosed clinically as yaws and nearly all such sera were positive. Yaws is extremely common and it is most likely that a large percentage of the remaining positive sera are also from yaws patients

WIDAL REACTIONS.

Total	..	..	..	..	43
Negative	..	..	..	..	22

The positives are detailed below in such a way that the first name indicates the real infection, while the other names merely show that agglutination in a less degree also occurred in them, in the order shown :—

<i>Typhoid</i>	..	..	..	..	..	9
do. para A	..	..	..	..	..	1
do. do. para B	..	..	..	..	..	2
do. para B	..	..	..	..	..	2
						—
<i>Positive for Typhoid</i>	..	..	..	..	..	14
Para A	..	..	..	..	..	1
do. typhoid	..	..	..	..	..	1
do. do. para B	..	..	..	..	..	1
						—
<i>Positive for Para A</i>	..	..	..	..	..	3
Para B	..	..	..	..	..	2
do. para A	..	..	..	..	..	1
do. typhoid, para A	..	..	..	..	..	1
						—
<i>Positive for Para B</i>	..	..	..	..	..	4
<i>Total Positives</i>	..	..	..	..	..	21

URINES.

Total number examined	..	..	..	271
General examinations	..	..	..	96
Cultures	..	..	..	10
For bilharzia ova, Positive 41, Negative 124 = 165				

VACCINES.

Apart from the plague vaccine which is described elsewhere in detail only 7 other vaccines were made.

B. pyocyaneus	..	..	..	..	..	1
Staphylococcus	..	..	..	..	..	5
Streptococcus and staphylococcus	..	..	..	..	..	1
						7

BLOOD SMEARS.

These figures give no relative indication as to the prevalence of malaria in the community, since the blood films sent to us are usually those in which parasites are not easily found or which are sent to be confirmed as negative.

Malarial parasites :—

				European.	African.
Subtertian	..	..	..	21	13
Benign tertian	..	..	..	2	—
Quartan	..	..	—	—	2
Microfilaria loa	..	..	..	—	2
Lymphatic leukæmia	..	..	..	—	1
Relapsing fever spirochetæ	..	..	..	—	8
Blood counts	..	..	..	8	—
Negative	..	..	..	49	154
Totals	..	..	..	80	180

Sputum.

Tubercle bacilli present	..	..	..	..	..	..	..	70
„ „ negative	..	..	..	..	..	..	..	190
Pneumococci (pure) ..	..	..	..	..	..	..	..	12
Spirochaetes (probably from mouth)	..	..	..	..	..	..	..	2
Taenia segment (origin ?)	..	..	..	..	..	..	..	2
Total ..								276

Infective Discharges and Miscellaneous.

Smears for gonococci 12, pus general examination 32 :— Pustule-B. anthracis + Knee joint fluid 3. Skin scrapings 6. Leprosy smear 3. Blister fluid from lepers 6.

Cerebro-spinal fluid.—Examined 26. *T. gambiense* 1. Pneumococci 3.

Meningococci 3. *Lange's Gold Colloidal Test* 10.—Blood cultures 10. Blood for trypt 15, for microfilariæ 3. Gland culture 3. Liver puncture 1. Swab for K.L. B. 1. Abd. fluid 2. Buboes 2. Local anaesthetic, for sterility 1. Knife—blood stain 1. Negative findings 25. Total 161.

Estimating of Alcohol for Customs Dept—46 samples.

Blood sugar estimations—18.

Blood urea estimations 4.

Water Samples.

Showing the No. of times *B. coli* found in the smallest volume of each sample.

Source.	C.C.					
	Absent	100	10	1	0.1	0.01
Laboratory Tap	34	16		2		
Storage Reservoir No. 1	2	4	5			
do. No. 2	6	4	4			
do. No. 3			1			
Final Filter No. 1	5	2				
do. No. 2	6	3				
do. No. 3	7	1				
do. No. 4	8	1				
do. No. 5	6	3				
do. No. 6	9	—				
do. No. 7	1					
Soda waters, Accra	8	1	1			
Well water, Accra	—	—	1	2	2	31
Standpipes, Winnebah.	4					
Tank, Koforidua	—	1				1
Totals	96	36	14	2	2	32

Leptospira icterohaemorrhagiae.

During the year 100 *M. decumanus* have been examined. The bloods, urines and emulsions of kidneys have been examined under the dark field microscope and guinea pigs have been inoculated with kidney emulsions and in their turn examined. No leptospira was ever seen. The question of *L. icterohaemorrhagiae* being present during the recent yellow fever epidemics at Asamankese and Suhum was carefully considered and all evidence pointed to its absence.

Water Leptospira.

This organism has been grown in large numbers and attempts made to cause it to have pathogenic properties but so far without result.

The average length was 13.7 μ but forms as long as 60 μ were observed and they showed evidence of division into 5 sections.

These water leptospirae did not survive if a few drops of fresh human serum were added to large numbers suspended in a test-tube of tap water. It seems doubtful if the *Leptospira* obtained in mine slime can be the same variety as the free living water species.

Animal Examinations.

Guinea pigs,	Post-mortems other than experimental animals	12
Dogs,	do. do. (leukamia)	1
Dogs,	Trypanosoma congolense present.	2
Dogs,	For Negri bodies, negative	2
Ox lung,	Tubercle	1
Ox spleen,	Negative	1
Ox blood films,	T. vivax in 36 ; T. congolense in 1—sent from Yeji, Northern Territories.	309
Horses,	For trypanosomes, negative	2
Sheep Lung,	Broncho-pneumonia	1
Rats Blood,	Cricetomys gambianus—Spirochaeta laverani, Graha- mella and haemogregarines	1
	Grahamella and haemogregarines	6
	Grahamella only	7
	Negative	5
		19
Total		350

Examinations of Rats for Bacillus pestis.

Species.	Live Rats.	Dead Rats.
Cricetomys gambianus	1138	50
Rattus rattus	141	70
Rattus norvegicus	53	2
Other spp.	5	—
Totals	1,337	122

In all the wild rats handled no case of chronic plague was observed.

Animal Experiments.

737 animals have been used in experiments during the year ; the majority being used in plague vaccine experiments and the results are described elsewhere in this report.

Other experiments are shown below.

Animals.	Experiment.	Number	Findings.
Guinea pigs	Human trypanosomes	3	T. congolense
	do. sub-inoc.	1	
	Dog trypanosomes ..	3	
	Water leptospira ..	12	
	Culture tests	2	
	Leptospira from <i>Rattus</i> <i>norvegicus</i>	140	—
	Yellow fever	24	See above.
	Feeding	12	—
	Culture tests	1	—
	Water leptospira ..	3	—
Rats. <i>Cricetomys gam- bianus.</i>	Bacillus pestis	3	Positive.
	Relapsing fever	17	
	Test of Insulin samples	7	
	Total	228	Results below.
			—
			—

TESTS OF INSULIN SAMPLES, FEBRUARY, 1927.

ANIMAL USED IN EXPERIMENTS=C. GAMBIANUS. ARTERIAL BLOOD OBTAINED
BY HEART PUNCTURE. INTRAMUSCULAR DOSE OF INSULIN.

	SAMPLE No. 1.			SAMPLE No. 2.				
	To be used before December, 1925.			New sample, date not shown.				
	1	2	3	4	5	6	7	
Rats fasting ..	1.5	1.5	1.5	—	—	—	3	Hours.
Blood Sugar imme- diately before Insul- in dose	134	129	194	—	347	324	220	mgms %.
Weight of Rat ..	28	38	36	26.5	40	24	23	ozs.
Insulin dose ..	1	1	—	—	1	1	1	c.cs.
Blood Sugar one hour after Insulin dose	152	176	— (died)	160	316	?	120	mgms %.
Increase or Decrease of Blood Sugar ..	+13.4	+37.2	—	—	—8.9	?	—45	%.
Report	Potency of Sample negligible.			Satisfactory Sample.				

METEOROLOGICAL OBSERVATIONS—LABORATORY GROUNDS.

Month.	Rainfall in inches.	Highest Maximum Temperature recorded.	Lowest Minimum Temperature recorded.	Daily average Mean.	Temperature of the Dew Point	
					Highest.	Lowest.
April ..	0.44	90°	77°	83.7°	—	—
May ..	1.58	89°	73°	81.06°	—	—
June ..	1.37	85°	72°	79.5°	—	—
July ..	0.56	84°	70°	77.7°	—	—
August ..	0.01	81°	70°	75.6°	—	—
September ..	1.30	83°	72°	75.9°	—	—
October ..	1.92	86°	72°	79.6°	74.7°	70.9°
November ..	0.70	86°	73°	80.7°	74.3°	71.2°
December ..	0.31	86°	74°	80.6°	74.7°	59.2° Harmattan.
January ..	0.85	86°	66°	78.0°	76.0°	44.1° Harmattan.
February ..	3.16	89°	72°	81.3°	76.0°	68.9°
March ..	2.23	87°	74°	81.7°	77.4°	69.9°

Total Rainfall = 14.43 inches.

SEKONDI LABORATORY.

This Laboratory was opened February, 1926. Dr. Robinson writes the Report.

STAFF.

European :—One Pathologist Assistant Pathologist. One Laboratory Assistant.

Major Ingoldby, R.A.M.C., Pathologist, was in charge from February, 1926 until September, 1926 when he went on leave returning to the Colony on 15th March, 1927.

Dr. G. Robinson, Assistant Pathologist, took charge from September, 1926 to March, 1927 and on being relieved by Major Ingoldby proceeded to the Research Institute, Accra.

Mr. Woodward was on duty until 2nd January, 1927, when he went on leave being relieved by Mr. Abbott.

Native :—One Laboratory Attendant, Mr. Paittoo, and two Laboratory boys.

Work was recommenced in the laboratory in March, 1926. The laboratory is situated close to the European and Native Hospitals and the Child Welfare Clinic, and the laboratory is indebted to the S.M.O. and the M.Os. in charge of these institutes for facilities allowed us.

A water centrifuge was installed in the laboratory during the year. Steps have been taken to install an acetylene gas plant.

LEPTOSPIRA ICTERHAEMORRHAGIAE IN RATS.

During October and November 1926, 80 rats were carefully examined for *L. icterohaemorrhagiae*.

Species were	<i>C. gambianus</i>	3
	<i>R. rattus</i>	77

The juice of kidneys was examined by dark ground illumination and stained smears; also sections were cut and stained by the Levaditi method. All results were negative.

RAT EXAMINATIONS.

There was no case of plague in Sekondi during the year in review.

Rats received from M.O.H.

	<i>C. gambianus.</i>	<i>M. rattus.</i>	<i>R. coucha.</i>	Monthly total.
March ..	0	0	0	0
April ..		516		516
May ..		89	1	90
June ..		149		149
July ..		331		331
August ..		463		463
September ..		781		781
October ..	2	638		640
November ..		549		549
December ..		496		496
January ..		489		489
February ..		416		416
March ..		476		476
Total ..	2	5,393	1	5,396

Rats examined for *B. pestis*—2160. No infected rats were found.

WIDAL REACTIONS	..	..	..	..	..	Total	20.
3 showed agglutination of typhoid	..	..	..	..	..	1/25.	
2	..	..	..	..	..	1/125.	
1	..	..	..	..	..	1/250.	
3	..	..	..	para. A	..	1/50.	
1	..	..	..	B	..	1/50.	
1	..	..	..	B	..	1/250.	
4	..	..	..	A	..	1/1000.	

<i>Sputum</i>	..	..	..	..	..	..	Total	77
Showing tubercle bacilli	..	..	..	..	..	..	..	20
Spirochætes	..	..	..	..	..	..	..	1
M. catarrhalis	..	..	..	..	..	..	..	1

<i>Urines</i>	..	..	..	..	..	..	Total	70
Bilharzia present	..	..	..	..	..	..	..	5
Sugar	..	..	..	..	..	..	..	1

Smears.—Leprosy 3 examined 2 positive. Plague—gland 1 negative. Urethral and vaginal 26 examined, 10 positive for gonococci.

POST-MORTEM EXAMINATIONS.

A total number of 80 bodies was examined post-mortem. In all except one case a true cause of death was found.

Deaths due to affections of :—

Lungs.

Broncho-pneumonia	..	..	..	..	..	..	..	2
" " tubercular	..	..	..	..	..	..	..	3
Lobar pneumonia	..	..	..	..	..	..	..	13
Pulmonary tuberculosis	..	..	..	..	..	..	..	1

Heart and Vessels.

Aneurysm of heart wall-rupture	..	..	..	..	..	..	..	1
" " pulmonary artery-rupture	..	..	..	..	..	..	..	1
Rupture of coronary artery	..	..	..	..	..	..	..	1
Fatty degeneration of myocardium (cause ?)	..	..	..	..	..	..	..	3
Pericarditis	..	..	..	..	..	..	..	1

Liver.

Congenital syphilitic cirrhosis	..	..	..	..	..	..	..	1
Cirrhosis—undefined	..	..	..	..	..	..	..	2
Fatty degeneration	..	..	..	..	..	..	..	1
Massive tuberculosis	..	..	..	..	..	..	..	1

Urinary System.

Chronic interstitial nephritis	..	..	..	..	..	..	..	3
--------------------------------	----	----	----	----	----	----	----	---

Intestines.

Dysentery	..	..	..	..	..	..	..	1
Colitis	..	..	..	..	..	..	..	1
Strangulated hernia	..	..	..	..	..	..	..	1

Peritonitis.

Perforation of dysenteric ulcer	..	..	..	..	..	..	..	2
Appendicitis	..	..	..	..	..	..	..	1
Perinephritic abscess	..	..	..	..	..	..	..	1

Accidents, etc.

Drowning	..	..	..	..	..	..	..	6
Gunshot wounds	..	..	..	..	..	..	..	2
Knife wounds	..	..	..	..	..	..	..	1
Rupture of liver	..	..	..	..	..	..	..	2
Rupture of spleen	..	..	..	..	..	..	..	4
Fracture of skull	..	..	..	..	..	..	..	8
Hanging (suicidal)	..	..	..	..	..	..	..	2
Fracture of ribs	..	..	..	..	..	..	..	2
Fracture of pelvis	..	..	..	..	..	..	..	1
Various injuries	..	..	..	..	..	..	..	2

Miscellaneous.

Miliary tuberculosis	..	..	..	..	..	..	..	2
Marasmus	..	..	..	..	..	..	..	1
Septicæmia	..	..	..	..	..	..	..	2
Cause unknown	..	..	..	..	..	..	..	4

LEPTOSPIRA IN WATER.

Leptospira were found in Sekondi tap water, lagoon and pond water.

They corresponded morphologically to *L. icterohæmorrhagiæ*. They passed through an ordinary household filter and an L 3 Chamberland filter under suction. Leptospira however were not detected in the filtrate until this had been incubated with sterile fæces for 10–20 days at 30°C.

Semi-solid blood agar medium and serum saline medium were inoculated with filtrate obtained by filtering tap water and fæces containing leptospira, however no leptospira were found even after incubation for 20 days at 30°C nor did they appear when some fæces was added to these media and again incubated for 20 days.

A guinea pig inoculated with some of the semi solid-blood agar medium (to which the filtrate had been added and incubated 20 days) remained healthy. It was killed in 10 days but no leptospira were found in sections of liver and kidney.

Two rats were inoculated with an emulsion of water and sterile fæces containing leptospira. These remained healthy and were killed in 10 days. Post-mortem there was no icterus and no hæmorrhages. No Leptospira were found in sections of kidneys and liver.

A rat inoculated with blood of one of these rats remained healthy.

Two guinea pigs were inoculated with an emulsion of water and sterile faeces containing Leptospira. One died in 4 days and post-mortem showed slight icterus but no hæmorrhages. No Leptospira were found in section of organs. The other guinea pig remained healthy.

BACILLARY DYSENTERY.

There were twenty cases of dysentery in which the causative organism was identified and proved serologically to be *B. dysenteriae* Flexner or *B. dysenteriae* Shiga.

B. dysenteriae Flexner was isolated 16 times.

B. Flexner Y being met with 9 times.

„ W „ „ 6 „

„ X „ „ „ 1 „

B. dysenteriae Shiga was isolated 4 times.

Natives accounted for 15 cases, 3 being caused by *B. dysenteriae* Shiga.

Europeans accounted for 5 cases, 1 being caused by *B. dysenteriae* Shiga.

Most of the cases occurred between May and July.

Other cases of dysentery in which non-lactose fermenting bacilli were isolated :— 12 cases.

<i>B. faecalis alkaligenes</i> isolated	..	..	..	..	..	1
An organism giving A G in glucose and Mannite						
producing A in milk	..	..	..	..	..	6
An organism of Shiga type	..	..	..	..	..	1
An organism of Morgan type	..	..	..	..	..	4

HISTOLOGICAL EXAMINATIONS.

Sixty-seven tissues were examined histologically.

They include livers 21, kidneys 11, hearts 4, spleen 4, pancreas 2, stomach 1, lungs 14, bladder 1, brain 1, ileum 1, testicle 1, mesentery 3, axillary gland 1, skin 2, nodules from arm 2.

Most of the above were post-mortem specimens.

SACHS-GEORGI.

21 samples of serum were received, 5 of these were positive.

<i>Blood Examination</i>	..	..	..	..	..	..	<i>Total</i>	649
<i>P. falciparum</i>	..	..	..	..	..	..	..	204
<i>P. malariae</i>	..	..	..	..	..	..	..	34
<i>P. vivax</i>	..	..	..	..	..	..	..	1
<i>P. falciparum</i> + <i>P. malariae</i>	..	..	..	..	..	..	..	6
Crescents	..	..	..	..	..	..	..	10

Bloods films for other protozoa—*Filaria* 8 negative, 1 positive. One blood film was remarkable in showing leprosy bacilli present in enormous numbers.

Blood Counts—White	..	..	..	..	..	5
Differential	..	..	..	..	..	37
Blood Cultures	..	..	..	..	..	2
Other	..	..	..	..	..	355

<i>Miscellaneous Examinations</i>	..	..	..	..	..	<i>Total</i> 46
Spinal fluid	..	..	..	..	..	2
Vaccines	..	..	..	..	..	10
Throat swabs	..	..	..	..	..	4
Police exhibits	..	..	..	..	..	4

<i>Faeces Examinations</i>	..	..	..	..	..	<i>Total</i> 285
Ankylostome ova	..	..	..	..	..	28
<i>E. histolytica</i>	..	..	..	..	..	20
<i>Ballantidium coli</i>	..	..	..	..	..	1
Dysentery caused by above	..	..	..	..	..	40
<i>B. dysenteriae</i> Flexner	..	..	..	..	..	16
<i>B. dysenteriae</i> Shiga	..	..	..	..	..	4

<i>Agglutinations.</i>	..	..	..	..	..	<i>Total</i> 52
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Animal Inoculations.

3 Guinea-pigs with water leptospira

1 Guinea-pig with tuberculosis

1 Guinea-pig with an unknown organism cultured from heart blood of Rat with a chicken.

2 Rats with water leptospira.

<i>Water Examinations</i>	..	..	..	..	..	..	<i>Total</i> 105.
Sekondi Tap Water	..	..	..	..	..	..	38 examined.
Abontiakoon Mines—Source	..	..	..	..	..	3	..
Abontiakoon Mines—Delivery	..	..	..	..	..	3	..
Abosso Mines—Source	..	..	..	..	..	2	..
Tarkwa Mines—Source	..	..	..	..	..	2	..
Tarkwa Mines—Delivery	..	..	..	..	..	1	..
Prestea Mines—Source	..	..	..	..	..	2	..
Prestea Mines—Delivery	..	..	..	..	..	2	..
Prestea Standpipe	..	..	..	..	..	1	..
Nsuta Water No. 1 Source	..	..	..	..	..	1	..
Nsuta Water No. 2 Delivery	..	..	..	..	..	1	..
Soda Waters	..	..	..	..	..	49	..

Results :—

Sekondi Tap Waters.

B. coli present in 10 cc 1 Time.

B. coli present in 100 cc 18 times.

B. faecalis alcaligenes present in 100 cc 1 time.

Abontiakoon Mines.

B. coli present in 1 cc 2 times.

Abosso Mines.

B. coli present 0.01 cc 1 time.

B. coli present 10 cc 1 time.

Tarkwa Mines.

B. coli present in 0.01 cc 2 times

Prestea Mines.

B. coli present in .1 cc 1 time.

B. coli present in 1 cc 1 time

B. coli present in 100 cc 2 times.

B. pyocyaneus in 1 cc 1 time.

Soda Waters.

B. coli present in 1 cc 2 times.

B. coli present in 10 cc 2 times.

B. coli present in 100 cc 14 times.

A case of massive Tuberculosis of the Liver.

According to text books on pathology the occurrence of large tumour-like tubercular masses in the liver is extremely rare. S.K., Male aged 27, was admitted to hospital complaining of a "lump in his stomach" which he said he had for 3 years. He was very wasted and ascites was present.

On palpation the liver was found to be very enlarged and to occupy most of the upper abdomen. The spleen was also thought to be enlarged. A liver and spleen puncture were done and thick caseous material was withdrawn from the liver in which tubercle bacilli were demonstrated. A diagnosis of tuberculosis of the liver was made. The patient died about 3 weeks later.

Post-Mortem.

The liver was enormously enlarged and covered with large tumour-like nodules some having a diameter of $1\frac{1}{2}$ ". These nodules were full of caseous, almost solid material. The liver was so adherent to the diaphragm, which, in its turn was so adherent to the heart and lungs that none of these organs could be separated. The small intestine, transverse colon and stomach were all involved in one huge mass of dense adhesion and could not be separated from the liver, and the whole mass including the spleen and kidneys had to be removed *in toto*. The mesenteric glands and the glands behind the sternum were as big as walnuts.

Tubercle bacilli were found in sections of liver, spleen and lungs a very interesting point being that the lungs were very slightly involved, there being only one small nodule at one apex. Naked eye the condition resembled a malignant growth.

The above specimen which is almost unique can be seen at the London School of Tropical Medicine.

FOWL TYPHOID (?)

During November, 1926, 3 young fowl all from the same bungalow were received dead in the laboratory.

The illness lasted 12-24 hours; loss of appetite and yellow diarrhoea being the main signs.

Cultures from faeces of the dead birds gave negative results.

The post-mortem appearances were negative except for slight emaciation in one case.

From the Heart blood—A non-motile, gram-negative bacillus was cultured in broth from one case.

The sugar fermentation reactions were, no gas formation, acid in glucose, mannite and dulcitol. Milk acid in 24 hours and neutral in 48 hours.

The organism was not agglutinated by any of the Standard Oxford Dysentery Flexner sera.

The organism is probably *B. sanguinarum* (*Salmonella gallinarum*).

A guinea pig was inoculated intraperitoneally with 0.5 cc of culture and was obviously ill the following day. It was killed the next day in case it might die during the night and post-mortem infection occur.

Post-Mortem.—There were peritoneal—pericardial and pleural effusions. An organism with same cultural characteristic as above was recovered from these 3 sources and from the heart blood.

5 cc of an emulsion of the living bacillus was fed to a healthy chicken which became ill on the 5th day and died on the 6th day.

Post-mortem.—There was nothing definite noted.

A culture of the above was obtained from the heart blood.

A rat inoculated with 0.5 cc of a 24 hours culture remained healthy.

ENTOMOLOGICAL REPORT.

Mr. Pomeroy, Medical Entomologist, has covered a lot of entomological ground. He gives a brief resumé of the work in his report as he is publishing his full reports elsewhere. In connection with his tsetse work at Yeji, however, I think he is mistaken when he suggests that the cattle obtain most of their trypanosome infection in the Gold Coast.

The facts I have available, appear to indicate that the infection is obtained prior to entry into Gold Coast territory or else just at the borders. Capt. Beale, Principal Veterinary Officer, is strongly of this opinion also.

Mr. Pomeroy might do useful work next tour investigating the actual condition at the border. Until this is done his work at Yeji is incomplete, and without the "border" information is not as valuable as would be the case if this information were known.

His report is in Appendix "A."

ACKNOWLEDGMENTS.

The Medical Research Institute is greatly indebted for material sent by practically every Medical Officer.

Especially thanks, however, must be tendered to Mr. A. J. R. O'Brien, Surgical Specialist, for the large amount of material he has made available to us, and also for the facilities afforded us in the Gold Coast Hospital; to Dr. G. E. H. Le Fanu and Dr. C. V. Le Fanu, Specialists in charge of the European Hospital; and to Dr. A. J. Hawe, Gold Coast Hospital, also to Drs. Harper, Moffat and Forde in charge of the Hospital, Sekondi.

To Mr. W. H. Evans, Public Works Department, in charge Korle Bu, thanks are also tendered for much assistance and help in many directions.

W. A. YOUNG, *Director,*

Medical Research Institute, Gold Coast.

April 1st, 1927.

RETURNS.

TABLE I.—MEDICAL STAFF ON 31ST MARCH, 1927.

- 1 Director of Medical and Sanitary Services.
- 1 Deputy Director of Medical and Sanitary Services.
- 1 Deputy Director of Sanitary Service.
- 1 Director of Medical Research Institute.
- 2 Assistant Directors of Medical Service.
- 2 Surgical Specialists.
- 1 Medical Specialist.
- 5 Senior Medical Officers.
- 3 Senior Sanitary Officers.
- 2 Pathologists (one seconded from the R.A.M.C.).
- 2 Assistant Pathologists (one seconded from the Medical Officers' Staff).
- 1 Medical Entomologist.
- 46 Medical Officers (4 of whom are Medical Officers of Health).
- 4 Lady Medical Officers (Infant Clinics).
- 2 African Medical Officers.

Vacancies :—

- 1 Senior Medical Officer.
- 3 Medical Officers.
- 5 Medical Officers of Health.
- 2 Lady Medical Officers (Infant Clinic).
- 1 Lady Medical Officer (Maternity Hospital).
- 1 African Medical Officer.
- 1 Dental Surgeon.
- 1 Analytical Chemist.
- 1 Office Assistant and Accountant.
- 1 Medical Storekeeper.
- 1 Dispensers Instructor.
- 1 Radiographer.
- 1 Assistant Radiographer.
- 11 Superintending Sanitary Inspectors.
- 1 Laboratory Superintendent.
- 2 Laboratory Assistants.

EUROPEAN NURSING STAFF.

- 4 Senior Nursing Sisters.
- 16 Nursing Sisters.

PRINCIPAL MEMBERS OF THE SUBORDINATE STAFF OF :—

- (a) *Medical Department.*
- (b) *Sanitation Branch.*
- (c) *Medical Research Institute.*
- (d) *Lunatic Asylum.*
- (a) 2 Chief Dispensers.
- 6 First Division Dispensers.

4 First Division Nurses.

1 Chief Clerk.

1 First Division Clerk.

(b) 1 Chief Clerk.

1 First Division Clerk.

1 Sanitary Inspector and Training Officer.

1 Senior Division Sanitary Inspector.

4 First Division Sanitary Inspectors.

(c) 3 Laboratory Attendants.

1 Clerk.

(d) 1 Chief Attendant.

1 Assistant Chief Attendant.

1 Matron.

TABLE III.

Accurate Return of Statistics of Population for the year cannot be given as the birth and death registration districts cover but a small portion of the Colony and its dependencies.

TABLE SHOWING SUMMARY OF ROUTINE WORK DONE DURING 1926-27.

I.—NAME OF TOWNS.

Station.	1924-25		1925-26.		1926-27.	
	Approximate Area.	No. of proclaimed open spaces.	Approximate Area.	No. of proclaimed open spaces.	Approximate Area.	No. of proclaimed open spaces.
Accra	8.5 Square Miles	32	8.5 Square Miles	32	8.5 Square Miles	35
Cape Coast	2½	4	2½	4	2½	4
Sekondi	"	3	"	3	"	3
Kumasi	"	—	"	—	"	—
Koforidua	"	—	"	—	"	4

2.—POPULATION.

Station.	1924-25.						1925-26.						1926-27.					
	Natives.			Europeans.			Natives.			Europeans.			Natives.			Europeans.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
Accra	25,229	22,500	48,429	626	74	700	26,000	23,000	49,000	680	100	780	26,000	22,429	48,429	493	78	571
Cape Coast ..	7,310	7,549	14,909	32	18	50	7,380	7,620	15,000	39	14	53	7,380	7,620	15,000	58	24	82
Sekondi ..	8,300	5,800	14,437	291	46	337	7,000	5,600	12,600	291	60	351	7,000	5,600	12,600	296	46	342
	*25,632		26,036	369	35	404	†9,822	†8,692	18,514	393	42	435	*26,260	2,552	28,812	419	35	454
Kumasi ..	—		—	—	—	—	—	—	—	—	—	—	3,052	—	3,052	54	6	60
Koforidua ..	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

*Logarithmic calculation.

†House-to-house census by untrained staff.

3—HOUSING.

Station.	1924-25.				1925-26.				1926-27.			
	Houses		Huts.		Houses.		Huts.		Houses.		Huts.	
	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.	Europeans.	Natives.
Accra ..	240	3,365	See	Houses.	260	3,400	—	—	275	3,451	—	—
Cape Coast	30	1,374	—	400	32	1,421	—	—	24	1,554	—	156
Sekondi ..	140	1,255	—	—	182	1,422	—	—	162	1,352	—	—
Kumasi ..	154	1,482	—	98	153	1,236	—	—	160	1,334	—	—
Koforidua	—	—	—	—	—	—	—	—	34	972	—	6

5.—(a) LATRINES.

Station.	1924-25.						1925-26.						1926-27.						
	Number.			New Ones.			Number.			New Ones.			Number.			New Ones.			
	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.	Male.		Female.	
	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	No.	Seats.	
Accra	54	567	46	323	6	36	36	56	587	48	343	2	20	59	617	51	373	3	30
Cape Coast	16	114	16	126	—	—	—	15	114	15	126	—	—	18	120	17	132	3	8
Sekondi	19	125	11	74	—	—	—	29	213	21	166	5	44	27	182	21	150	7	32
Kumasi	42	409	46	499	7	70	130	38	499	36	480	5	46	32	412	31	345	1	16
Koforidua	—	—	—	—	—	—	—	—	—	—	—	—	—	11	63	10	57	2	10

5.—(b) LATRINES (PRIVATE).

Station.	1924-25.								1925-26.								1926-27.							
	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of night soil men.	Cesspools.	Cesspools cleansed.	New cesspools.	Cesspools abolished.	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of night soil men.	Cesspools.	Cesspools cleansed.	New cesspools.	Cesspools abolished.	No.	Pails removed daily.	No. of clean pails substituted for dirty ones.	No. of night soil men.	Cesspools.	Cesspool cleansed.	New cesspools.	Cesspools abolished.
Accra	840	840	840	129	—	—	—	—	988	883	883	130	—	—	—	—	939	838	1,929	145	—	—	—	—
Cape Coast	118	734	—	25	—	—	—	—	206	561	76	17	—	—	—	—	225	489	262	25	—	—	—	—
Sekondi	375	375	—	50	—	—	—	—	443	881	881	72	—	—	—	—	523	580	859	77	—	—	—	—
Kumasi	271	492	914	96	—	—	—	—	372	744	1,488	69	—	—	—	—	440	1,197	1,197	89	—	—	—	—
Koforidua	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	80	250	60	15	—	—	—	—

6.—REMOVAL OF REFUSE.

Station.	1924-25.						1925-26.						1926-27.					
	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from street.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from street.	Carts removing refuse from yards and premises.	Amount of refuse from yards and premises.	Men employed.	Dustbins.	Carts removing street refuse.	Amount of refuse removed daily from street.	Carts removing refuse from yards and premises.	Amount of refuse removed from yards and premises.	Men employed.
Accra ..	42	6 Lorries.	60 Lorry loads.	3	35 Cart loads.	50	44	7 Lorries and 6 carts.	45 Lorry loads.	4	38 Lorry loads.	45	47	7 Lorries	45	3	40 Cart loads.	45
Cape Coast ..	35	1 and 2 lorries.	62 Cart loads.	—	2 Cart loads.	14	35	3 Lorries and 1 Cart.	64 Cart loads.	—	2 Cart loads.	62.7 lorry and cart loads.	34	4 Lorries & 1 Cart.	62.7 lorry and cart loads.	—	2 Cart loads.	13
Sekondi ..	23	3 Lorries.	95 head loads.	—	300	39	25	3 Lorries.	28 Lorry loads.	—	28 Lorry loads.	41	29	3 Lorries.	25 lorry loads.	—	included in (3) 66 Cart loads & 352 baskets.	54
Kumasi ..	13 & 35	1	122 head loads and cart loads	4	125 head loads	12	32	3 lorries 2 carts and 8 baskets.	10,589 baskets.	4 baskets.	360 head loads.	4	38 & 48	1	3,505 Cart loads & head loads.	—	—	—
Koforidua ..	—	—	—	—	—	—	—	—	—	—	—	—	7	4	25 Cart loads.	—	10	12

7.—MODE OF DISPOSAL OF EXCRETA, REFUSE AND OFFAL.

Station.	1924-25.												1925-26.												1926-7.											
	Buried or trenched.			Burnt.			Thrown into sea.			Otherwise dealt with.			Buried or trenched.			Burnt.			Thrown into sea.			Otherwise dealt with.			Buried or trenched.			Burnt.			Thrown into sea.			Otherwise dealt with.		
	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.	Pails of excreta per day.	Cartloads refuse per day.	Cartloads offal per day.			
Accra ..	—	—	—	—	—	—	—	—	—	883	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Cape Coast ..	—	31	1½	—	—	—	—	—	—	561	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Sekondi ..	735	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Kumasi ..	492	6	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Koforidua ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		

8.—AVERAGE DAILY NUMBER OF CARTLOADS OF CANS, BOTTLES, AND INCOMBUSTIBLE MATERIALS FROM HOUSES AND COMPOUNDS.

Station.	1924-25.	1925-26.	1926-27.
Accra ..	35 Cartloads	38 Cartloads	40 Cartloads.
Cape Coast ..	2 Cartloads	2 Cartloads	2 Cartloads.
Sekondi ..	12 Headloads	12 Headloads	40 Headloads.
Kumasi ..	6 Lorry Loads	10 Cartloads	184 Cartloads.
Koforidua ..	—	—	4 Cartloads.

1924-25.

Station.	Pipe-Borne Water.			Wells.				Tanks.					Barrels.					
				Public.		Private.		Public.		Private.		Nature of Tank.						
	Source.	Public Stand-Pipe.	Private Stand-pipe.	No.	Mosquito proof.	Public.		Private.		Above ground.	Mosquito proof.	Wood.		Iron.	Concrete.	No.	Mosquito proof.	
						No.	Mosquito proof.	Above ground.	Mosquito proof.									
Accra	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Cape Coast	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Sekondi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Kumasi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1925-1926.																		
Accra	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Cape Coast	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Sekondi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Kumasi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
1926-1927.																		
Accra	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Cape Coast	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Sekondi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Kumasi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Koforidua	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	

10.—DRAINAGE.

Station.	Masonry Drains.										Earth Drains.					
	1924-25.					1925-26.					1924-25.			1925-26.		
	Lineal Yards.	Lineal Yards reconstructed.	Lineal Yards repaired.	Lineal Yards constructed.	Lineal Yards.	Lineal Yards reconstructed.	Lineal Yards repaired.	Lineal Yards constructed.	Lineal Yards.	Lineal Yards reconstructed.	Lineal Yards dug.	Lineal Yards cleaned.	Lineal Yards dug.	Lineal Yards cleaned.	Lineal Yards dug.	Frequency of cleaning.
Accra ..	63,213	606	9—	8,569	75,962	877	—	12,749	83,820	1,798	586	5,474	14,742	1,331	40,861	Fortnightly.
Cape Coast ..	26,420	—	47	747	28,360	—	—	1,940	30,300	80	50	1,151	6,001	—	4,378	Monthly.
Sekondi ..	28,383	—	1,300	1,889½	30,810	—	120	6,066	33,911	—	120	3,100	25,926	—	10,947	When necessary.
Kumasi ..	3,276	—	1,450	1,826	15,453	—	1,450	253	16,912	—	—	1,459	8,424	700	21,083	When necessary.
Koforidua ..	—	—	—	—	—	—	—	—	6,188	—	17	3,589	—	—	—	Every ten days.

Station.

Frequency of cleaning.

Lineal Yards dug.

Lineal Yards cleaned.

Frequency of cleaning.

Lineal Yards dug.

Lineal Yards cleaned.

Frequency of cleaning.

Lineal Yards dug.

Lineal Yards cleaned.

Lineal Yards reconstructed.

Lineal Yards repaired.

Lineal Yards reconstructed.

Lineal Yards.

Lineal Yards constructed.

Lineal Yards repaired.

Lineal Yards reconstructed.

Lineal Yards.

Lineal Yards constructed.

Lineal Yards repaired.

Lineal Yards reconstructed.

Lineal Yards.

II.—INSPECTIONS AND PROSECUTIONS.

Station	1924-5.										1925-26.										1926-27.									
	Inspectors employed.	Houses inspected.	Houses where larvae were found.	Notices against larvae.	Persons fined for larvae.	Notices re insanitary condition.	Persons fined for insanitary condition.	No. of Soda and aerated factories inspected.	Inspectors employed.	Houses inspected.	Houses where larvae were found.	Notices against larvae.	Persons fined for larvae.	Notices re insanitary condition.	Persons fined for insanitary condition.	No. of Soda and aerated factories inspected.	Inspectors employed.	Houses inspected.	Houses where larvae were found.	Notices against larvae.	Persons fined for larvae.	Notices re insanitary condition.	Persons fined for insanitary condition.	No. of Soda and aerated factories inspected.						
Accra ..	26	165,450	1,107	505	737	630	1,360	3	26	141,025	899	145	710	1,898	1,258	3	20	132,491	838	106	689	2,405	1,983	5						
Cape Coast ..	12	59,560	287	424	251	114	66	—	12	65,662	269	368	239	251	83	—	12	64,630	483	196	417	382	453	—						
Sekondi ..	14	72,368	138	5	73	235	255	1	12	49,076	183	46	102	367	551	1	13	55,021	176	113	135	1,480	669	2						
Kumasi ..	17	50,778	483	62	469	1,315	4,331	1	11	83,003	258	44	202	1,678	2,385	1	19	96,547	263	203	197	3,769	3,603	1						
Koforidua ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	28,683	538	160	527	235	251	—						

TABLE V.

RETURN OF DISEASES AND DEATHS (IN-PATIENTS) FOR THE YEAR 1926-27.

Diseases.	Remaining in Hospital at end of 1925-26	Yearly Total.		Total Cases Treated	Remaining in Hospital at end of 1926-27.	Remarks
		New Cases	Deaths.			
I.—Epidemic, Endemic, and Infectious Diseases.						
1. ENTERIC GROUP—						
(a) Typhoid Fever	—	13	2	13	1	
(b) Paratyphoid A	—	12	1	12	2	
(c) Paratyphoid B.	—	—	—	—	—	
(d) Type not defined	—	6	1	6	—	
2. Typhus	—	—	—	—	—	
3. Relapsing Fever	—	25	4	25	—	
4. Undulant Fever	—	—	—	—	—	
5. Malaria—						
(a) Tertian	2	124	—	126	—	
(b) Quartan	—	—	—	—	—	
(c) Aestivo-autumnal	2	527	2	529	9	
(d) Cachexia	—	24	2	24	4	
(e) Blackwater	—	7	3	7	—	
(e) Unclassified	2	205	2	207	1	
6. Smallpox	—	2	—	2	—	
Alastrim	—	—	—	—	—	
7. Measles	—	6	—	6	—	
8. Scarlet Fever	—	—	—	—	—	
9. Whooping Cough	—	2	—	2	—	
10. Diphtheria	—	—	—	—	—	
11. Influenza	2	82	—	84	—	
12. Miliary Fever	—	—	—	—	—	
13. Mumps	—	4	—	4	—	
14. Cholera	—	—	—	—	—	
15. Epidemic diarrhoea	—	—	—	—	—	
16. Dysentery—						
(a) Amoebic	3	168	20	171	2	
(b) Bacillary	—	122	10	122	4	
(c) Undefined or due to other causes	1	92	9	93	2	
17. Plague—						
(a) Bubonic	—	—	—	—	—	
(b) Pneumonic	—	—	—	—	—	
(c) Septicaemic	—	—	—	—	—	
(d) Undefined	—	—	—	—	—	
18. Yellow Fever	22	—	20	22	—	
19. Spirochaetosis						
ictero-haemorrhagica	—	2	—	2	—	
20. Leprosy	1	97	1	98	77	
21. Erysipelas	—	1	—	1	—	
22. Acute Poliomyelitis	—	2	—	2	—	
23. Encephalitis Lethargica	—	—	—	—	—	
24. Epidemic Cerebro-spinal Fever.	—	1	1	1	—	
25. Other Epidemic Diseases—						
(a) Rubeola (German Measles	—	8	—	8	—	
(b) Varicella (Chicken-pox)	4	123	—	127	8	
(c) Kala-azar	—	—	—	—	—	
(d) Phlebotomus Fever	—	—	—	—	—	
(e) Dengue	—	5	—	5	—	
(f) Epidemic Dropsy	—	—	—	—	—	
(g) Yaws	4	172	2	176	8	
(h) Trypanosomiasis	—	31	11	31	4	
26. Glanders	—	—	—	—	—	
27. Anthrax	—	2	1	2	—	
28. Rabies	—	—	—	—	—	
Carried forward						

Diseases.	Remaining in Hospital at end of 1925-26.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at end of 1926-27.	Remarks.
		New Cases.	Deaths			
<i>Brought forward ..</i>						
<i>I.—Epidemic, Endemic, and Infantious Diseases (contd.)</i>						
29. Tetanus	2	20	15	22	1	
30. Mycosis	—	1	—	1	—	
31. Tuberculosis Pulmonary and Laryngeal	11	183	80	194	7	
32. Tuberculosis of the Menings or Central Nervous System ..	—	1	—	1	—	
33. Tuberculosis of the Intestines or Peritoneum	—	8	5	8	2	
34. Tuberculosis of the Vertebral Column	—	17	1	17	9	
35. Tuberculosis of Bones and joints	—	23	4	23	4	
36. Tuberculosis of other organs ..	—	—	—	—	—	
(a) Skin or Subcutaneous Tissue (Lupus)	—	1	—	1	—	
(b) Bones	—	4	—	4	—	
(c) Lymphatic System	—	9	1	9	2	
(d) Genito-urinary	—	—	—	—	—	
(e) Other organs	—	—	—	—	—	
37. Tuberculosis disseminated—						
(a) Acute	—	3	1	3	1	
(b) Chronic	—	2	—	2	—	
38. Syphilis—						
(a) Primary	1	50	—	51	5	
(b) Secondary	—	27	—	27	—	
(c) Tertiary	2	91	8	93	5	
(d) Hereditary	2	7	—	9	—	
(e) Period not indicated ..	—	9	—	9	3	
39. Soft Chancre	3	63	—	66	5	
40. A.—Gonorrhoea and its com- plications	9	299	1	308	9	
B.—Gonorrhoeal Ophthalmia	—	5	—	5	—	
C.—Gonorrhoeal Arthritis ..	—	56	—	56	—	
D.—Granuloma Venereum ..	—	1	—	1	—	
41. Septicaemia	—	24	16	24	—	
42. Other Infectious Diseases ..	2	1	—	3	—	
<i>II.—General Diseases not mentioned above.</i>						
43. Cancer or other malignant Tumours of the Buccal Cavity	—	3	—	3	1	
44. Cancer or other malignant Tumours of the Stomach	—	3	2	3	—	
45. Cancer or other malignant Tumours of the Perito- neum Intestines, Rectum	—	3	2	3	—	
46. Cancer or other malignant Tumours of the Female Genital Organs	—	—	—	—	—	
47. Cancer or other malignant Tumour of the Breast ..	—	1	—	1	—	
48. Cancer or other malignant Tumours of the Skin ..	—	7	—	7	—	
49. Cancer or other malignant Tumours of Organs not specified	—	17	4	7	4	
50. Tumours non-Malignant	4	53	2	57	12	
51. Acute Rheumatism	—	—	—	—	—	
52. Chronic Rheumatism	3	186	—	189	2	
53. Sourvy (including Barlow's Disease)	—	—	—	—	—	
54. Pellagra	—	—	—	—	—	
55. Beri-Beri	7	40	10	7	1	
<i>Carried forward</i>						

Diseases.	Remaining in Hospital at end of 1925-26.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at end of 1926-27	Remarks.
		New Cases	Deaths.			
<i>Brought forward</i>						
<i>II.—General Diseases not mentioned above (contd.)</i>						
56. Rickets	—	4	—	4	—	
57. Diabetes (not including Insipidus	—	3	—	3	—	
58. Anaemia, ...	—	1	—	1	—	
(a) Pernicious	—	1	—	1	—	
(b) Other Anæmias and Chlorosis	1	35	2	36	—	
59. Diseases of the Pituitary Body	—	—	—	—	—	
60. Diseases of the Thyroid Gland—	—	1	—	—	—	
(a) Exophthalmic Goitre	—	1	—	1	—	
(b) Other diseases of the Thyroid Gland	—	—	—	—	—	
Myxœdema	—	—	—	—	—	
61. Diseases of the Para-Thyroid	—	—	—	—	—	
62. Diseases of the Thymus	—	—	—	—	—	
63. Diseases of the Supra-Renal Gland	—	—	—	—	—	
64. Diseases of the Spleen	—	7	1	7	1	
65. Leukæmia—	—	—	—	—	—	
(a) Leukæmia	—	3	2	3	—	
(b) Hodgkin's Disease	—	1	—	1	—	
66. Alcoholism	—	19	—	19	—	
67. Chronic poisoning by mineral substances (lead, mercury, &c.)	—	5	2	5	1	
68. Chronic poisoning by organic substances (morphia, cocaine, &c.)	—	1	1	1	—	
69. Other General Diseases—	8	—	—	8	—	
Auto-intoxication	—	2	—	2	—	
Purpura Hæmorrhagica	—	—	—	—	—	
Hæmophilia	—	—	—	—	—	
Diabetes Insipidus	—	—	—	—	—	
<i>III.—Affections of the Nervous System and Organs of the Senses.</i>						
70. Encephalitis (not including Encephalitis Lethargica	—	3	2	3	—	
71. Meningitis (not including Tuber- culous Meningitis or Cerebro- spinal Meningitis	—	14	6	14	—	
72. Locomotor Ataxia	—	4	—	4	—	
73. Other affections of the Spinal Cord	—	7	2	7	—	
74. Apoplexy—	—	—	—	—	—	
(a) Hæmorrhage	—	10	4	10	1	
(b) Embolism	—	2	2	2	—	
(c) Thrombosis	—	3	2	3	—	
75. Paralysis—	—	1	—	1	—	
(a) Hemiplegia	2	37	3	39	5	
(b) Other Paralysis	—	16	—	16	2	
76. General Paralysis of the Insane	—	2	—	2	—	
77. Other forms of Mental Aliena- tion	3	29	2	32	1	
78. Epilepsy	1	20	—	21	1	
79. Eclampsia, Convulsions (non- puerperal) 5 years or over.	—	2	1	2	—	
80. Infantile Convulsions	—	—	—	—	—	
<i>Carried forward</i>						

<i>Diseases.</i>	<i>Remaining in Hospital at end of 1926-27.</i>	<i>Yearly Total.</i>		<i>Total Cases Treated.</i>	<i>Remaining in Hospital at end of 1926-27.</i>	<i>Remarks.</i>
		<i>New Cases</i>	<i>Deaths.</i>			
<i>Brought forward</i>						
<i>III.—Affections of the Nervous System and Organs of the Senses. (contd.)</i>						
81. Chorea	—	—	—	—	—	
82. A.—Hysteria	—	5	—	5	—	
B.—Neuritis	—	5	—	5	5	
C.—Neurasthenia	—	24	—	24	—	
83. Cerebral Softening	—	2	2	2	—	
84. Other affections of the Nervous System, such as Paralysis Agitans	4	8	3	32	4	
85. Affections of the Organs of Vision—						
(a) Diseases of the Eye	—	26	—	26	—	
(b) Conjunctivitis	—	109	—	109	—	
(c) Trachoma	—	4	—	4	—	
(d) Tumours of the Eye	—	4	—	4	—	
(e) Other affections of the Eye	8	62	—	70	8	
86. Affections of the Ear or Mastoid Sinus	—	32	1	32	1	
<i>IV.—Affections of the Circulatory System.</i>						
87. Pericarditis	—	5	2	5	1	
88. Acute Endocarditis or Myocar- ditis	1	16	1	17	1	
89. Angina Pectoris	—	—	—	—	—	
90. Other Diseases of the Heart—	—	5	3	5	—	
(a) Valvular	—	12	4	12	—	
Mitral	1	37	2	38	—	
Aortic	—	8	2	8	—	
Tricuspid	—	—	—	—	—	
Pulmonary	—	2	—	2	—	
(b) Myocarditis	—	28	6	28	2	
91. Diseases of the Arteries—						
(a) Aneurism	—	3	1	3	1	
(b) Arterio-Sclerosis	—	6	—	6	1	
(c) Other diseases	3	10	4	13	1	
92. Embolism or Thrombosis (non- cerebral)	—	1	—	—	—	
93. Diseases of the Veins—						
Hæmorrhoids	2	68	—	70	3	
Varicose Veins	—	3	—	3	—	
Phlebitis	—	2	1	2	—	
94. Diseases of the Lymphatic System—	—	—	—	—	—	
Lymphangitis	1	44	2	2	—	
Lymphadenitis, Bubo (nonspecific)	1	92	2	93	1	
95. Hæmorrhage of undetermined cause	—	—	—	—	—	
96. Other affections of the Circula- tory System	—	—	—	—	—	
<i>Carried forward</i>						

<i>Diseases.</i>	<i>Remaining in Hospital at end of 1925-26.</i>	<i>Yearly Total.</i>		<i>Total Cases Treated</i>	<i>Remain- ing in Hospital at end of 1926-7.</i>	<i>Remarks.</i>
		<i>New Cases</i>	<i>Deaths</i>			
<i>Brought forward ..</i>						
<i>V.—Affections of the Respira- tory System.</i>						
97. Diseases of the Nasal Pasages	—	1	—	1	—	
Adenoids	1	5	—	6	—	
Polypus	—	2	—	2	—	
Rhinitis	1	7	—	8	—	
Coryza	1	14	—	15	1	
98 Affections of the Larynx—						
Laryngitis	—	12	—	12	—	
99 Bronchitis—	1	40	—	41	—	
(a) Acute	6	163	15	169	9	
(b) Chronic	—	70	1	70	3	
100. Broncho-pneumonia	—	144	15	144	1	
101. Pneumonia—						
(a) Lobar	2	216	51	218	8	
(b) Unclassified	3	48	9	51	5	
102. Pleurisy, Empyema	2	72	9	74	5	
103. Congestion of the Lungs	—	6	1	6	—	
104. Gangrene of the Lungs	—	—	—	—	—	
105. Asthma	1	14	1	15	—	
106. Pulmonary Emphysema	—	—	—	—	—	
107. Other affections of the Lungs—	5	6	2	11	—	
Pulmonary Spirochaetosis						
<i>VI.—Diseases of the Digestive System.</i>	—	—	—	—	—	
108. A.—Diseases of Teeth or Gums—Caries, Pyorrhœa &c.	—	67	—	67	1	
B.—Other affections of the .. Mouth—	—	1	—	1	1	
Stomatitis	1	19	1	20	—	
Glossitis, &c., ...	1	8	1	9	—	
109. Affections of the Pharynx or Tonsils—						
Tonsillitis	—	7	—	27	—	
Pharyngitis	—	16	1	16	—	
110. Affections of the Œsophagus	—	27	—	7	1	
111. A.—Ulcer of the Stomach	—	12	—	12	2	
B.—Ulcer of the Duodenum	—	2	—	2	—	
112. Other affections of the Sto- mach	—	53	—	53	—	
Gastritis, Dyspepsia, &c.,	—	51	1	51	—	
113. Diarrhœa and Enteritis						
Under two years	1	26	2	27	—	
114. Diarrhœa and Enteritis—						
Two years and over	5	298	6	303	4	
Colitis	1	49	1	50	1	
Ulceration	—	3	—	3	—	
114a Sprue	—	—	—	—	—	
115. Ankylostomiasis	2	51	—	53	1	
116. Diseases due to Intestinal Parasites—						
(a) Cestoda (Tœnia)	—	40	—	40	1	
(b) Trematoda (Flukes)	—	4	—	4	—	
(c) Nematoda (other than Ankylostoma)	—	3	—	3	—	
Ascaris	1	33	—	34	—	
Trichocephalus dispar	—	3	—	3	—	
Trichina	—	—	—	—	—	
Dracunculus	10	336	—	346	10	
<i>Carried forward</i>	10					

Diseases.	Remaining in Hospital at end of 1925-26.	Yearly Total		Total Cases Treated.	Remaining in Hospital at end of 1926-27.	Remarks.
		New cases.	Deaths.			
<i>Brought forward</i>						
VI.— <i>Diseases of the Digestive System (contd.)</i>						
Strongylus	—	2	—	2	—	
Oxyuris	—	7	—	7	—	
(d) Coccidia	—	6	—	6	—	
(e) Other parasites	—	6	—	6	—	
(f) Unclassified	1	4	2	5	—	
117. Appendicitis	—	25	2	25	1	
118. Hernia	16	174	7	190	14	
119. A.—Affections of the Anus, Fistula, &c.	—	41	2	41	3	
B.—Other affections of the Intestines—	—	7	2	7	—	
Enteroptosis	—	—	—	—	—	
Constipation	—	269	—	269	2	
120. Acute Yellow Atrophy of the Liver	—	1	1	1	—	
121. Hydatid of the Liver	—	—	—	—	—	
122. Cirrhosis of the Liver—	—	—	—	—	—	
(a) Alcoholic	—	4	—	4	—	
(b) Other forms	—	7	5	7	—	
123. Biliary Calculus	—	1	—	1	1	
124. Other affections of the Liver—						
Abscess	1	16	2	17	1	
Hepatitis	4	67	2	71	—	
Cholecystitis	—	1	—	1	—	
Jaundice	1	26	—	27	4	
125. Diseases of the Pancreas	—	—	—	—	—	
126. Peritonitis (of unknown cause)	1	10	5	11	—	
127. Other affections of the Digestive System	3	20	7	23	1	
VII.— <i>Diseases of the Genito-urinary System (non-Venereal).</i>						
128. Acute Nephritis	6	53	24	59	2	
129. Chronic do.	—	51	51	51	1	
130. A.—Chyluria	—	—	—	—	—	
B.—Schistosomiasis	1	72	2	73	8	
131. Other affections of the Kidneys	—	3	—	3	—	
Pyelitis, &c., ...	3	11	2	14	3	
132. Urinary Calculus	—	2	—	2	—	
133. Diseases of the Bladder—						
Cystitis	3	32	1	35	3	
134. Diseases of the Urethra—						
(a) Stricture	9	105	10	114	3	
(b) Other	1	33	2	34	1	
135. Diseases of the Prostate—						
Hypertrophy	—	1	—	1	—	
Prostatitis	—	19	1	19	1	
136. Diseases (non-Veneral) of the Genital Organs of Man—						
Epididymitis	—	35	—	35	1	
Orchitis	1	51	1	52	2	
Hydrocele	3	45	—	48	2	
Ulcer of Penis	8	55	—	63	1	
Others	1	13	—	14	1	
137. Cysts or other non-malignant Tumours of the Ovaries	—	—	—	—	—	
138. Salpingitis—	—	11	—	11	1	
Abscess of the Pelvis	—	9	—	9	1	
139. Uterine Tumours (non-malignant)	—	13	2	13	3	
<i>Carried forward</i>						

<i>Diseases.</i>	<i>Remaining in Hospital at end of 1925-26.</i>	<i>Yearly Total.</i>		<i>Total Cases Treated.</i>	<i>Remaining in Hospital at end of 1926-27.</i>	<i>Remarks.</i>
		<i>New Cases.</i>	<i>Deaths</i>			
<i>Brought forward ..</i>						
<i>VII.—Diseases of the Genito- urinary System (non-venereal (contd.)</i>						
140. Uterine Hæmorrhage (non- puerperal)	—	10	—	10	—	
141. A.—Metritis	—	22	—	22	—	
B.—Other affections of the Female Genital Organs—	1	23	—	24	—	
Displacements of Uterus	—	15	2	15	4	
Amenorrhœa	—	1	—	1	—	
Dysmenorrhœa	1	18	—	19	—	
Leucorrhœa	—	4	—	4	—	
142. Diseases of the Breast (non- puerperal)—	—	—	—	—	—	
Mastitis	—	5	—	5	—	
Abscess of Breast ..	—	4	—	4	—	
<i>VIII.—Puerperal State.</i>						
143. Normal Labour	—	17	1	17	1	
B.—Accidents of Pregnancy—						
(a) Abortion	—	22	1	22	3	
(b) Ectopic Gestation ..	—	2	—	2	—	
(c) Other accidents of Pregnancy	1	32	10	33	1	
144. Puerperal Hæmorrhage ..	—	—	—	—	—	
145. Other accidents of Parturi- tion	—	8	1	8	—	
146. Puerperal Septicæmia ..	—	5	3	5	—	
147. Phlegmasia Dolens	—	1	—	1	—	
148. Puerperal Eclampsia ..	—	1	—	1	—	
149. Sequelæ of Labour	1	15	2	16	—	
150. Puerperal affections of the Breast	—	—	—	—	—	
Others	4	19	1	23	1	
<i>IX.—Affections of the Skin and Cellular Tissues.</i>						
151. Gangrene	—	4	1	4	—	
152. Boil—	—	62	1	62	—	
Carbuncle	—	59	—	59	1	
153. Abscess—	8	269	5	277	13	
Whitlow	1	46	—	47	1	
Cellulitis	12	189	2	201	5	
154. A.—Tinea	1	59	—	201	5	
B.—Scabies	—	26	—	26	—	
155. Other Diseases of the Skin—	6	66	1	72	—	
Erythema	—	3	—	3	—	
Urticaria	—	7	—	7	—	
Eczema	1	16	—	17	—	
Herpes	—	8	—	8	—	
Psoriasis	—	—	—	—	—	
Elephantiasis	4	28	1	32	—	
Myiasis	—	—	—	—	—	
Chiggers.. ..	—	1	—	1	—	
Cutaneous Leishmani- asis	—	—	—	—	—	
Ulcers	103	673	15	776	128	
<i>Carried forward ..</i>						

<i>Diseases.</i>	<i>Remaining in Hospital at end of 1925-26.</i>	<i>Yearly Total.</i>		<i>Total Cases Treated</i>	<i>Remaining in Hospital at end of 1926-27.</i>	<i>Remarks.</i>
		<i>New Cases</i>	<i>Deaths</i>			
<i>Brought forward ..</i>						
<i>X.—Diseases of Bones and Organs of Locomotion (other than Tuberculous.)</i>						
156. Diseases of Bones—						
Osteitis	3	55	5	58	4	
157. Diseases of Joints—						
Arthritis	5	66	—	71	4	
Synovitis	4	83	—	87	7	
158. Other Diseases of Bones or Organs of Locomotion ..	12	66	4	78	7	
<i>XI.—Malformations.</i>						
159. Malformations—						
Hydrocephalus	—	1	—	1	—	
Hypospadias	—	—	—	—	—	
Spina Bifida &c., ..	—	8	—	8	2	
<i>XII.—Diseases of Infancy.</i>						
160. Congenital Debility	—	3	—	3	—	
161. Premature Birth	—	1	—	—	3	
162. Other affections of Infancy	—	3	—	3	—	
163. Infant neglect (infants of three months or over).	—	—	—	—	—	
<i>XII.—Affections of Old Age.</i>						
164. Senility—	—	3	2	3	—	
Senile Dementia	—	1	—	1	1	
<i>XIV.—Affections produced by Ex- ternal Causes.</i>						
165. Suicide by Poisoning	—	1	1	1	—	
166. Corrosive Poisoning (inten- tional	—	—	—	—	—	
167. Suicide by Gas Poisoning ..	—	—	—	—	—	
168. Suicide by Hanging or Strangu- lation	—	1	1	1	—	
169. Suicide by Drowning	—	—	—	—	—	
170. Suicide by Firearms	—	—	—	—	3	
171. Suicide by cutting or stabbing Instruments	1	2	3	3	—	
172. Suicide by jumping from a height	—	—	—	—	—	
173. Suicide by crushing	—	—	—	—	—	
174. Other Suicides	—	8	—	8	—	
175. Food Poisoning	—	—	—	—	—	
Botulism	—	—	—	—	—	
176. Attacks of poisonous animals—						
Snake Bite	—	10	1	10	—	
Insect Bite	—	4	—	4	—	
177. Other accidental Poisonings	—	15	2	15	—	
178. Burns (by Fire)	2	25	4	27	—	
179. Burns (other than by Fire)	1	7	—	8	—	
180. Suffocation (Accidental) ..	—	—	—	—	—	
181. Poisoning by Gas (accidental)	—	—	—	—	—	
182. Drowning (accidental)	—	—	—	—	—	
183. Wounds (by Firearms, war excepted)	7	110	14	117	7	
<i>Carried forward ..</i>						

Diseases.	Remaining in Hospital at end of 1925-26.	Yearly Total.		Total Cases Treated.	Remaining in Hospital at end of 1926-27.	Remarks.
		New Cases.	Deaths.			
<i>Brought forward</i>						
XIV.—Affections produced by External Causes (contd.)						
184. Wounds (by cutting or stab- bing Instruments)	14	366	16	380	14	
185. Wounds (by Fall)	6	334	3	240	7	
186. Wounds (in Mines or Quarries)	—	11	—	11	—	
187. Wounds (by Machinery) ..	—	35	—	35	—	
188. Wounds (crushing, <i>e. g.</i> , rail- way accidents, &c.)	9	335	29	344	20	
189. Injuries inflicted by Animals Bites, Kicks, &c.	—	11	1	11	1	
190. Wounds inflicted on Active Service	—	4	—	4	—	
191. Executions of civilians by belligerents	—	—	—	—	—	
192. A.—Over fatigue	—	1	—	1	—	
B.—Hunger or Thirst	—	2	—	2	—	
193. Exposure to cold, frost bite, &c.	—	—	—	—	—	
194. Exposure to Heat—	—	—	—	—	—	
Heatstroke	—	1	—	1	—	
Sunstroke	—	—	—	—	—	
195. Lightning Stroke	—	3	—	3	—	
196. Electric Shock	—	—	—	—	—	
197. Murder by Firearms	—	—	—	—	—	
198. Murder by cutting or stabbing Instruments	—	4	4	4	—	
199. Murder by other means	—	—	—	—	—	
200. Infanticide (Murder of an infant under one year)	—	—	—	—	—	
201. A.—Dislocation	—	25	—	25	3	
B.—Sprain	—	35	—	35	—	
C.—Fracture	14	176	16	190	21	
202. Other external Injuries ..	44	317	8	361	5	
203. Deaths by Violence of unknown cause	—	1	—	1	—	
XV.—Ill-Defined Diseases.						
204. Sudden Death (cause unknown)	—	2	—	2	—	
205. A.—Diseases not already specified or ill-defined—	—	19	1	19	—	
Ascites	—	6	—	6	—	
Edema	—	8	1	8	—	
Asthenia	2	45	8	47	—	
Shock	—	8	—	8	—	
Hyperpyrexia	—	12	—	12	—	
B.—Malingering	—	75	—	75	—	
XVI.—Diseases, the total of which have not caused 10 Deaths	—	4	1	4	—	
Born in Hospital	2	3	—	5	1	
Admitted with the mother ..	—	10	—	10	1	
Admitted with the child ..	1	12	—	13	1	
Total	489	11,284	700	11,773	626	

Surgical Operations—Major 1,148; Minor 1921.

TABLE VI.

RETURN OF DISEASES (OUT-PATIENTS) FOR THE YEAR 1926-1927.

Diseases.						Male.	Female.
<i>I.—Epidemic, Endemic, and Infectious Diseases.</i>							
1. Enteric Group—							
(a) Typhoid Fever	..	..	..	..		3	—
(b) Paratyphoid A.	..	..	..	..		3	—
(c) Paratyphoid B.	..	..	..	..		—	—
(d) Type not defined	..	..	..	..		34	13
2. Typhus	..	..	..	..	..	—	—
3. Relapsing Fever	..	..	..	..	..	22	5
4. Undulant Fever	..	..	..	..	..	—	—
5. Malaria—							
(a) Tertian	..	..	..	..	..	843	332
(b) Quartan	..	..	..	..	..	67	24
(c) Aestivo-autumnal	..	..	..	..	..	1,516	630
(d) Cachexia	..	..	..	..	..	377	274
(e) Blackwater	..	..	..	..	..	—	—
(f) Unclassified	..	..	..	..	..	963	517
6. Smallpox—	..	..	..	..	..	96	74
Alastrim	..	..	..	..	..	7	5
7. Measles	..	..	..	..	..	21	17
8. Scarlet Fever	..	..	..	..	..	—	—
9. Whooping Cough	..	..	..	..	..	53	47
10. Diphtheria	..	..	..	..	..	—	—
11. Influenza	..	..	..	..	..	111	25
12. Miliary Fever	..	..	..	..	..	—	—
13. Mumps	..	..	..	..	..	6	1
14. Cholera	..	..	..	..	..	—	—
15. Epidemic diarrhoea	..	..	..	..	..	12	6
16. Dysentery—							
(a) Amœbic	..	..	..	..	..	250	94
(b) Bacillary	..	..	..	..	..	14	9
(c) Undefined or due to other causes	..	..	..	..	..	129	21
17. Plague—							
(a) Bubonic	..	..	..	..	..	—	—
(b) Pneumonic	..	..	..	..	..	—	—
(c) Septicæmic	..	..	..	..	..	—	—
(d) Undefined	..	..	..	..	..	—	—
18. Yellow Fever	..	..	..	..	..	49	15
19. Spirochætosis ictero-hæmorrhagica	..	..	..	..	..	—	—
20. Leprosy	..	..	..	..	..	474	96
21. Erysipelas	..	..	..	..	..	7	—
22. Acute Poliomyelitis	..	..	..	..	..	2	—
23. Encephalitis Lethargica	..	..	..	..	..	—	—
24. Epidemic Cerebro-spinal Fever	..	..	..	..	..	2	—
25. Other Epidemic Diseases—							
(a) Rubeola (German Measles)	..	..	..	..	..	2	1
(b) Varicella (Chicken-pox)	..	..	..	..	..	32	6
(c) Kala-azar	..	..	..	..	..	—	—
(d) Phlebotomus Fever	..	..	..	..	..	—	—
(e) Dengue	..	..	..	..	..	2	1
(f) Epidemic Dropsy	..	..	..	..	..	—	—
(g) Yaws (includes cases in Venereal Clinic)	..	..	..	..	..	10,339	7,744
(h) Trypanosomiasis	..	..	..	..	..	28	8
26. Glanders	..	..	..	..	..	—	—
<i>Carried forward</i>							

Diseases.	Male.	Female.
<i>Brought forward</i>		
<i>I.—Epidemic, Endemic, and Infectious Diseases (contd).</i>		
27. Anthrax	4	—
28. Rabies	—	—
29. Tetanus	18	6
30. Mycosis	—	—
31. Tuberculosis, Pulmonary and Laryngeal	241	80
32. Tuberculosis of the Meninges or Central Nervous System	—	—
33. Tuberculosis of the Intestines or Peritoneum	5	3
34. Tuberculosis of the Vertebral Column	13	5
35. Tuberculosis of Bones and Joints	19	4
36. Tuberculosis of other organs—		
(a) Skin or Subcutaneous Tissue (Lupus)	10	6
(b) Bones	1	—
(c) Lymphatic System	16	5
(d) Genito-urinary	3	—
(e) Other organs	11	11
37. Tuberculosis disseminated—		
(a) Acute	3	4
(b) Chronic	1	—
38. Syphilis—		
(a) Primary (Includes cases in Venereal Clinic)	229	64
(b) Secondary do.	223	93
(c) Tertiary do.	231	249
(d) Hereditary	41	62
(e) Period not indicated	66	61
39. Soft Chancre (Includes cases in Venereal Clinic)	280	—
40. A.—Gonorrhoea and its complications	2,333	1,128
B.—Gonorrhoeal Ophthalmia	22	4
C.—Gonorrhoeal Arthritis	114	70
D.—Granuloma Venereum	5	2
41. Septicæmia	4	1
42. Other Infectious Diseases—	7	2
<i>II.—General Diseases not mentioned above.</i>		
43. Cancer or other malignant Tumours of the Buccal Cavity	2	—
44. Cancer or other malignant Tumours of the Stomach or Liver	3	—
45. Cancer or other malignant Tumours of the Peritoneum, Intestines, Rectum	—	1
46. Cancer or other malignant Tumours of the Female Genital Organs	—	3
47. Cancer or other malignant Tumours of the Breast	—	6
48. Cancer or other malignant Tumours of the Skin	10	1
49. Cancer or other malignant Tumours of Organ not specified	10	3
50. Tumours non-Malignant	107	66
51. Acute Rheumatism	—	—
52. Chronic Rheumatism	2,379	1,356
53. Scurvy (including Barlow's Disease)	—	—
54. Pellagra	—	—
55. Beri-Beri	21	5
56. Rickets	11	2
<i>Carried forward</i>		

<i>Diseases.</i>						<i>Male.</i>	<i>Female.</i>
<i>Brought forward</i>						15,726	10,051
<i>II.—General Diseases not mentioned above (contd.).</i>							
57	Diabetes (not including Insipidus)	..	..	..	..	7	2
58.	Anæmia—						
	(a) Pernicious	..	..	..	..	2	—
	(b) Other Anæmias and Chlorosis	..	..	..	..	278	153
59.	Diseases of the Pituitary Body	..	..	..	..	—	—
60.	Diseases of the Thyroid Gland, ...	..	..	..	..	1	—
	(a) Exophthalmic Goitre	..	..	..	..	5	3
	(b) Other diseases of the Thyroid Gland, Myxœdema	..	..	..	..	3	9
61.	Diseases of the Para-Thyroid Glands	..	..	..	..	2	—
62.	Diseases of the Thymus	..	..	..	..	—	—
63.	Diseases of the Supra-Renal Glands	..	..	..	..	—	1
64.	Disease of the Spleen	..	..	..	..	59	21
65.	Leukæmia—					—	—
	(a) Leukæmia	..	..	..	..	1	—
	(b) Hodgkin's Disease	..	..	..	..	1	—
66.	Alcoholism	..	..	..	..	18	—
67.	Chronic poisoning by mineral substances (lead mercury, &c.)	..	..	..	..	—	—
68.	Chronic poisoning by organic substances (morphia, Cocaine, &c.)	..	..	..	..	2	—
69.	Other General Diseases—					1	1
	Auto-intoxication	..	..	..	..	—	—
	Purpura Hæmorrhagica	..	..	..	..	—	—
	Hæmophilia	..	..	..	..	1	—
	Diabetes Insipidus	..	..	..	..	1	1
<i>III—Affections of the Nervous System and Organs of the Senses.</i>							
70.	Encephalitis (not including Encephalitis Lethargica)					8	2
71.	Meningitis (not including Tuberculous Meningitis or Cerebrospinal Meningitis)	..	..	..	..	11	4
72.	Locomotor Ataxia	..	..	..	..	9	1
73.	Other affections of the Spinal Cord	..	..	..	..	9	—
74.	Apoplexy—						
	(a) Hæmorrhage	..	..	..	..	3	—
	(b) Embolism	..	..	..	..	—	—
	(c) Thrombosis	..	..	..	..	—	—
75.	Paralysis—						
	(a) Hemiplegia	..	..	..	..	102	12
	(b) Other Paralyzes	..	..	..	..	65	19
76.	General Paralysis of the Insane	..	..	..	..	2	—
77.	Other forms of Mental Alienation	..	..	..	..	35	14
78.	Epilepsy	..	..	..	..	120	29
79.	Eclampsia, Convulsions (nonpuerperal) 5 years or over	..	..	..	..	—	—
80.	Infantile Convulsions	..	..	..	..	8	6
81.	Chorea	..	..	..	..	5	4
82.	A.—Hysteria	..	..	..	..	31	22
	B.—Neuritis	..	..	..	..	123	88
	C.—Neurasthenia	..	..	..	..	95	12
	D.—Neuralgia	..	..	..	..	61	7
83.	Cerebral Softening	..	..	..	..	2	—
<i>Carried forward</i>							

<i>Diseases.</i>	<i>Male.</i>	<i>Female.</i>
<i>Brought forward</i>		
III.—Affections of the Nervous System and Organs of the Senses (contd.).		
84. Other affections of the Nervous System, such as Paralysis Agitans	83	32
85. Affections of the Organs of Vision—		
(a) Diseases of the Eye	169	107
(b) Conjunctivitis	1,272	523
(c) Trachoma	62	40
(d) Tumours of the Eye	8	27
(e) Other affections of the Eye	384	81
86. Affections of the Ear or Mastoid Sinus	821	275
Affections of Organs of speech, (deafness and tongue tie)	2	—
IV.—Affections of the Circulatory System.		
87. Pericarditis	16	1
88. Acute Endocarditis or Myocarditis	17	3
89. Angina Pectoris	8	3
90. Other Diseases of the Heart—	2	—
(a) Valvular—		
Mitral	86	53
Aortic	24	9
Tricuspid	1	—
Pulmonary	8	5
(b) Myocarditis	56	8
91. Diseases of the Arteries—		
(a) Aneurism	9	4
(b) Arterio-Sclerosis	49	17
(c) Other diseases	35	17
92. Embolism or Thrombosis (non-cerebral)	2	—
93. Diseases of the Veins—		
Hæmorrhoids	166	60
Varicose Veins	26	1
Phlebitis	6	1
94. Diseases of the Lymphatic System—		
Lymphangitis	65	16
Lymphadenitis, Bubo (non-specific)	335	48
95. Hæmorrhage of undertermined cause	3	—
96. Other affections of the Circulatory System	5	—
V.—Affections of the Respiratory System.		
97. Diseases of the Nasal Passages—	7	—
Adenoids	12	7
Polypus	5	3
Rhinitis	100	39
Coryza	123	19
98. Affections of the Larynx—		
Laryngitis	114	30
99. Bronchitis—		
(a) Acute	538	277
(b) Chronic	3,334	902
100. Broncho-Pneumonia	77	36
<i>Carried forward</i>		

Diseases.	Male.	Female.
<i>Brought forward</i>		
V.— <i>Affections of the Circulatory System (contd.).</i>		
101. Pneumonia—		
(a) Lobar	173	56
(b) Unclassified	24	9
102. Pleurisy, Empyema	140	44
103. Congestion of the Lungs	44	26
104. Gangrene of the Lungs	1	—
105. Asthma	60	27
106. Pulmonary Emphysema	51	20
107. Other affections of the Lungs—	43	—
Pulmonary Spirochætosis	2	1
VI.— <i>Diseases of the Digestive System.</i>		
108. A.—Diseases of Teeth or Gums—Caries, Pyorrhœa, &c.	904	274
B.—Other affections of the Mouth—	12	4
Stomatitis	168	97
Glossitis, &c.	82	17
109. Affections of the Pharynx or Tonsils—		
Tonsillitis	163	70
Pharyngitis	222	82
Hæmatemesis	1	1
110. Affections of the Œsophagus	1	1
111. A.—Ulcer of the Stomach	6	3
B.—Ulcer of the Duodenum	6	—
112. Other affections of the Stomach—	10	—
Gastritis	351	128
Dyspepsia, &c.	564	340
113. Diarrhœa and Enteritis—		
Under two years	430	179
114. Diarrhœa and Enteritis—		
Two years and over	1,035	191
Colitis	137	23
Ulceration	123	40
114a. Sprue	—	—
115. Ankylostomiasis	246	122
116. Diseases due to Intestinal Parasites—		
(a) Cestoda (Tænia)	374	103
(b) Tremotoda (Flukes)	41	19
(c) Nematoda (other than Ankylostoma)—		
Ascaris	312	140
Trichocephalus dispar	—	1
Trichina	—	—
Dracunculus	526	117
Strongylus	—	—
Oxyuris	15	6
(d) Coccidia	—	—
(e) Other parasites	12	4
(f) Unclassified	14	8
117. Appendicitis	16	5
<i>Carried forward</i> ..		

Diseases.	Male.	Female.
<i>Brought forward</i>		
VI.— <i>Diseases of Digestive System (contd.)</i>		
118. Hernia	305	14
119. A.—Affections of the Anus, Fistula, &c.	108	24
B.—Other affections of the Intestines—	49	4
Enteroptosis	31	7
Constipation	6,751	1,887
120. Acute Yellow Atrophy of the Liver	3	—
121. Hydatid of the Liver	—	—
122. Cirrhosis of the Liver—	—	—
(a) Alcoholic	2	1
(b) Other forms	4	2
123. Biliary Calculus	2	—
124. Other affections of the Liver—	10	2
Abscess	34	46
Hepatitis	109	39
Cholecystitis	1	1
Jaundice	41	19
125. Diseases of the Pancreas	7	2
126. Peritonitis (of unknown cause)	14	4
127. Other affections of the Digestive System	162	51
VII.— <i>Diseases of the Genito-urinary System (non-Vene- real).</i>		
128. Acute Nephritis	86	47
129. Chronic do.	71	24
Hæmaturia	3	2
130. A.—Chyluria	—	—
B.—Schistosomiasis	94	25
131. Other affections of the Kidneys—	4	2
Pyelitis, &c.	8	3
132. Urinary Calculus	3	—
133. Diseases of the Bladder—		
Cystitis.. .. .	152	1
134. Diseases of the Urethra—		
(a) Stricture	189	81
(b) Other	79	1
135. Diseases of the Prostate—		
Hypertrophy	2	13
Prostatitis	56	—
136. Diseases (non-Venereal) of the Genital Organs of Man—		
Epididymitis.. .. .	54	—
Orchitis	129	—
Hydrocele	131	—
Varicocele	1	—
Ulcer of Penis	74	—
Phimosi and Para-phimosis	64	—
137. Cysts or other non-malignant Tumours of the Ovaries	—	3
138. Salpingitis—	—	5
Abscess of the Pelvis	—	27
139. Uterine Tumours (non-malignant)	—	24
<i>Carried forward</i>		

Diseases.	Male.	Female.
<i>Brought forward</i>		
VII.—(<i>Diseases of the Genito-urinary System, non-Venereal</i>).		
140. Uterine Hæmorrhage (non-puerperal)	—	37
141. A.—Metritis	—	160
B.—Other affections of the Female Genital Organs	—	8
Displacements of Uterus	—	69
Amenorrhœa	—	85
Dysmenorrhœe	—	152
Leucorrhœa	—	152
142. Diseases of the Breast (non-puerperal)—	—	4
Mastitis	—	46
Abscess of Breast	—	35
VIII.— <i>Puerperal State</i> .		
143. A.—Normal Labour	—	60
Vomiting of Pregnancy	—	3
B.—Accidents of Pregnancy—		
(a) Abortion	—	55
(b) Ectopic Gestation	—	1
(c) Other accidents of Pregnancy	—	43
144. Puerperal Hæmorrhage	—	4
145. Other accidents of Parturition	—	2
146. Puerperal Septicæmia	—	5
147. Phlegmasia Dolens	—	—
Sterility	—	19
148. Puerperal Eclampsia	—	1
149. Sequelæ of Labour	—	11
Rape	—	16
150. Puerperal affections of the Breast	—	6
IX.— <i>Affections of the Skin and Cellular Tissues</i>		
151. Gangrene	3	2
152. Boil—	519	129
Carbuncle	155	31
153. Abscess—	449	65
Whitlow	375	66
Cellulitis	449	130
154. A.—Tinea	479	267
B.—Scabies	485	122
155. Other Diseases of the Skin—	252	75
Vaccination Ulcers	94	51
Erythema	68	42
Urticaria	86	42
Eczema	440	170
Herpes	100	26
Psoriasis	11	7
Ainhum	11	—
Elephantiasis	60	29
Myiasis	2	1
Chiggers	18	13
Cutaneous Leishmaniasis	—	—
Ulcers	—	—
<i>Carried forward</i>		

<i>Diseases.</i>	<i>Male.</i>	<i>Female.</i>
<i>Brought forward</i>		
X.—Diseases of Bones and Organs of Locomotion (other than Tuberculous).	5,518	2,289
156. Diseases of Bones—		
Osteitis	191	133
157. Diseases of Joints—	14	3
Arthritis	475	233
Synovitis	279	58
158. Other Diseases of Bones or Organs of Locomotion	555	196
XI.—Malformations.		
159. Malformations—	11	4
Hydrocephalus	6	—
Hypospadias	1	—
Spina Bifida &c.	—	—
XII.—Diseases of Infancy.		
160. Congenital Debility	11	8
161. Premature Birth	1	—
162. Other affections of Infancy	24	11
163. Infant neglect (infants of three months or over ..	5	3
XIII.—Affections of Old Age.		
164. Senility—	18	17
Senile Dementia	6	1
XIV.—Affections produced by External Cases.		
165. Suicide by Poisoning	1	—
166. Corrosive Poisoning (intentional)	1	—
167. Suicide by Gas Poisoning	—	—
168. Suicide by Hanging or Strangulation	6	—
169. Suicide by Drowning	1	—
170. Suicide by Firearms	—	—
171. Suicide by cutting or stabbing Instruments ..	1	—
172. Suicide by jumping from a height	—	—
173. Suicide by crushing	—	—
174. Other Suicides	—	—
175. Food Poisoning—	31	12
Botulism	—	—
176. Attacks of poisonous animals—		
Snake Bite	25	1
Insect Bite	53	72
177. Other accidental Poisonings	25	7
178. Burns (by fire)	91	24
179. Burns (other than by Fire)	21	7
180. Suffocation (accidental)	—	—
181. Poisoning by Gas (accidental)	—	—
182. Drowning (accidental)	—	—
183. Wounds (by Firearms, war excepted)	52	8
184. Wounds (by cutting or stabbing Instruments) ..	1,286	251
185. Wounds (by Fall)	476	98
186. Wounds (in Mines or Quarries)	105	7
187. Wounds (by Machinery)	1,820	201
<i>Carried forward</i>		

APPENDIX A.

REPORT OF THE MEDICAL ENTOMOLOGIST.

I assumed the duties of my new appointment on December 5th, 1925. From December until April 19. 6 my time was occupied in studying the Mosquito problem in Accra, with special reference to the effect of salinity on the breeding of *Aedes argenteus*, the effect of breeding in the lagoons and crab-holes on the general incidence of mosquitos and possible prophylactic measures. The results will be published shortly in a special paper.

It was found that *Aedes argenteus* could successfully breed in 30% sea water that *Culex thalassius* bred in water of a very high percentage of salinity and that as species did not breed in artificial situations in the town itself, there was evidence to prove that certain types of mosquito infestation were the result of migration from the lagoons. The same evidence was obtained with regard to certain Anopheline mosquitos. Investigations were also carried out with regard to the possibilities of controlling the lagoon and its drainage basin by means of an insecticide, such as Paris Green and Road dust, distributed by an airplane, as carried out in the United States of America, and it is hoped that experiments with an airplane may be carried out along these lines at some future date.

From April until December, research was undertaken with regard to the control of termites, or white ants, in Accra, and Achimota. The results are being published in a Sessional Paper. Full details are given of the biology of the various economic species, careful estimates were made as to the economic loss, and practical methods of control were investigated. It was found that as most of the important economic species inhabited a communal mound, it was possible to shatter these by means of gelignite, and, by destroying the inmates by fumigation, to eliminate the main sources of infestation. Tests were made to poison the soil so treated, with various chemicals, in order to eliminate the remaining termites and prevent further infestation. The cost of the operations and further lines of research are fully discussed.

From December, 1926, to April, 1927, research was carried out at Yeji, on the Volta River, with regard to the tsetse problem with especial reference to the infection of cattle with trypanosomiasis, the bionomics of the species of *Glossina* found, the ecology of the area studied, and the problematical loss to livestock. The results are being published in a separate paper. The actual trypanosome infection in cattle was found to decrease during the dry season from 16% to 4%. Data was obtained which gives evidence that the infection prior to entry into British Territory, is comparatively small. It is probable that the last two abnormally dry seasons and consequent thorough burning of the country have had an appreciable effect on lessening the incidence of *Glossina*, that the increased motor traffic along the main road has driven the alternate host, the wild game further afield, and that migratory birds have a certain control on the adult tsetse. The relation of game to tsetse in the area studied is discussed and the natural and artificial means by which tsetse are spread over the country.

More practical and extensive lines of research are advocated if a satisfactory conclusion is to be reached. It is suggested that a Commission consisting of Two Entomologists, a Pathologist, a Veterinary Officer and if possible a Forest Botanist should work in conjunction and make an adequate survey of the entire main cattle route, collect accurate statistics on the actual loss, from Trypanosomiasis, ascertain the biological factors governing Tsetse distribution in each type of country along the cattle route, and carry out reasonably extensive experiments with regard to clearing the important Tsetse belts near the same. It is also suggested that data be collected as to the cost and feasibility of improving or constructing watering places, and possibly small grazing areas, near the halting places, to reduce the loss from overdriving.

If these suggestions are carried out it is hoped that a definite and practical scheme for improving the cattle supply can be presented to Government. It was found impossible to obtain the required data with the personnel supplied, one Entomologist and two Native Assistants.

A. W. S. POMEROY,

Medical Entomologist.

APPENDIX B.

ANALYSIS OF 4,473 CASES OF YAWS.

In accordance with paragraph 2 of the Secretary of State's Circular Despatch of February 11th, 1925, all Medical Officers were requested to make an investigation as to the suitability of bismuth in the treatment of yaws. The soluble Bismuth Sodium Pot. Tartrate was the preparation used.

The total number of cases treated on which this report is based amounted to 4,473 the preparation of Bismuth used being the soluble B.P.S.T. dissolved in water with 5% Phenol, and in a few cases, Glucose as the medium, the dosage ranged from $\frac{1}{2}$ grain in an infant up to 4 grains in an adult for a single injection. The dose which seemed to be most efficacious without the production of stomatitis was $\frac{1}{2}$ grain in children and $1\frac{1}{2}$ grains in adults, if this dosage was exceeded a blue line appeared on the gums which was followed by stomatitis if the dosage was persisted in.

The technique adopted varied, the majority of injections being intramuscular but the deep subcutaneous and also the intravenous routes were employed. The average amount of B.S.T. used for a full course of injections in an adult being about 14 grains; Some cases were met with which were resistant to B.S.T. but cleared up rapidly on N.A.B. medication.

Cases which appeared clinically to be yaws but did not improve either on B.S.T. or N.A.B. were probably wrongly diagnosed, the Wassermann Reaction as a means of diagnosis not being available outside Accra and its environs.

In primary yaws one injection of $1\frac{1}{2}$ grains is sufficient to cause an apparent cure although one observer states that one injection does not prevent the occurrence of the secondary rash. Two injections of $1\frac{1}{2}$ grains each will cause the secondary rash in an adult to clear up, but if treatment is then stopped the case probably relapses in from three to five months. The period of observation has been too short to make it possible to give any definite figure for the amount of B.S.T. required to effect a complete cure, but according to the information available to date, relapses have been observed to occur on a total dosage of from 5 grains in children to 10 grains in adults.

In dealing with the tertiary manifestations of this disease much larger doses were required, in the majority of cases some improvement was observed, ulcers healing up for a time but frequently breaking down again. It must be remembered that in most cases of chronic long standing ulceration, healing is delayed owing to the alteration in the blood supply due to the supervening cicatricial contraction. In some cases there was an apparent cure, the ulcers completely healing without any recurrence during the period of observation.

In foot yaws, clavus, osteitis and hyperkeratosis associated with pain in joints and bones, six grains of B.S.T. usually greatly improved or cured the pain, but the lesions themselves were in most cases unaltered and remained *in statu quo* even when the dosage was greatly increased.

With regard to gangosa, an average of about twelve grains B.S.T. will arrest the ulcerative process, healing however is slow.

The end results of treatment have not been worked out as patients refuse to remain in hospital for the length of time requisite, or if attending as out-patients cease attendance before cure is fully established. Early gangosa reacts well to B.S.T. particularly if the patients general health has not been adversely affected.

Complications.—Stomatitis was frequently met with, a dose of two grains often produced a blue line on the gums and the three to four grains doses were in most cases followed by a severe stomatitis. One Medical Officer stating in his report "the majority of cases get some slight mouth trouble after three grains, a few escape, while in a large proportion it is very severe, no food being taken, while the patient sits all day dribbling into a calabash of sand." Another Medical Officer gives 75% as the incidence of stomatitis. Pain, induration and swelling seem to have been of fairly constant occurrence, practically every case complained of some tenderness after the injection, the amount of pain and duration seems to vary with the technique employed.

Pyrexia occurred in a small proportion of the cases treated, it was mild in character and disappeared within forty-eight hours. Vomiting, diarrhoea and muscular weakness were also noticed, vomiting being of fairly frequent occurrence after intravenous injection, diarrhoea occasionally after intramuscular.

Deaths.—There were three cases of deaths after injection of B.S.T. two after intramuscular injection and one after intravenous. In the case of the death following an intravenous injection; an adult female suffering from tertiary yaws, pain in joints and bones with thickening of the periosteum of the lower extremities of the long bones.

On her first attendance she was given 2 grains B.S.T. in 5 cc glucose intravenously, a week later she was given a similar injection intravenously and died on her way home 16 minutes after the injection. No post-mortem was made.

The next two cases occurred after intramuscular injection, a male about 23 years suffering from tertiary yaws (joints pains) received 4 injections intramuscularly of 10 grains in all of B.S.T. on to 3 weeks after the last injection he was given gr. ii B.S.T. intramuscularly, a few minutes after the injection the patient collapsed and died in a very short time. Post-mortem scattered petechial haemorrhages of mucous membrane and of the pericardium and endocardium, the right side of the heart which had stopped in diastole, was engorged. The blood was dark and fluid, patients organs otherwise healthy. The third case, an adult healthy male with crab yaws of the feet, occurred the day following a second injection of 3 grains B.S.T., a first injection of $1\frac{1}{2}$ grains having been given 5 days previously. The injections were both deep subcutaneous in the tissues of the thigh. After the second injection he felt ill and unable to work, and collapsed the next day when attempting to lift a bag of "kernels" with another labourer.

Post-mortem showed nothing abnormal beyond slight paleness of the heart muscle and slight congestion of the kidneys.

Conclusions.—B.S.T. is effective in practically all cases of yaws. Large dosage and longer continued treatment being required in cases of long standing tertiary yaws.

It is easily and rapidly administered.

It is cheap.

On the other hand, it is extremely painful in intramuscular injection. The reaction is sometimes so severe as to render the patient unfit for work up for as long a period as seven days (abscess formation however was only seen in 5 cases); also the frequent occurrence of stomatitis which may be of a severe character and may prejudice the patient against its use.

Its administration is not without danger, three cases of death after its administration having been reported.

It is not so effective as N.A.B., more particularly in cases of foot yaws and tertiary lesions and there is a certain proportion of cases which while resistant to B.S.T. rapidly clear up on the administration of N.A.B. roughly about 5%.

E. MORRIS FRANKLIN,
Senior Medical Officer.

31st March, 1927.

APPENDIX C

REPORT ON LEPROSY IN THE HO DISTRICT, 1926-27.

From my observations, I should say there are more than 200 lepers, of all ages, in this district. At every outstation I visited in the early part of the year, these unfortunates attended and begged for some treatment, anything I could give them to check their pains and heal their sores. As this procedure was most unsatisfactory and monthly injections could do no good, I conceived the idea of building a place to house them, so that they could receive regular treatment and more important still, be kept isolated. I had erected two swish and grass huts of four rooms each, adjacent to the Hospital compound at Ho. A condition of admission was that the leper must stay in the Settlement or Hospital for as long as I considered necessary. The first admission was on the 30th September, 1926. Admissions, were, naturally, slow at first owing chiefly I think, to the suspicious nature of the native, but by the end of November, there were 29 inmates; applicants then began to flow in and more huts were erected to meet the rush. On the 31st March 1927, 77 lepers were in the Settlement under treatment. This number is the absolute limit I am able to house at present, and numerous applicants have been refused admission for the want of accommodation. On one occasion a chief of a certain village brought in all the lepers of his village, 15 in number, and most regretfully I had to send them back. Government was approached with the proposal of feeding these people, as the majority came from far distances and found it extremely difficult to feed themselves, so money was allotted for this purpose. At first this Settlement was an experiment, but by the end of December the experimental stage had passed and Government was again approached with a view of acquiring land and voting monies for the erection of a permanent one. On the acceptance by Government of the sound policy of this scheme, it is proposed to acquire about 25 acres of suitable land, $1\frac{1}{4}$ miles from Ho, for building the permanent Settlement and laying it out for farming purposes.

The buildings will be native built swish in the form of a square or compound, each house to consist of 6 rooms, each room 7 ft by 9 ft with a doorway 2 ft 6 in. and a window left 6 inches square. In the centre of each compound a kitchen. Two such compounds for males and two for females. Between each male compound will be an open recreation hut and the same for the females. A Superintendent will reside in the Settlement area and his quarters will be midway between the male and female compounds and 50 yards away on the windward side. It is also proposed that the inmates receive a maintenance allowance of 9d., a day that they be provided with cooking and eating utensils, lighting etc., agricultural implements and a yearly allowance of clothing, *viz.*, one blanket, 2 cover cloths and one mat.

Water supply will be provided by a well sunk within the area. Treatment—Intramuscular injections of Moogrol in 5 cc doses, according to age, and Potassium Iodide mixture by mouth are the lines of treatment I have adopted. Moogrol is given twice weekly until they have received 12 injections, then once a week.

I have found that the benefits derived from Moorol vary considerably in the types and stages of the disease. Anaesthetic cases seem to respond more readily than nodular and acute and subacute more than the advanced or chronic, in the last mentioned, absorption of the drug is hardly perceptible in some cases, consequently I have ceased to administer it. The early signs of relief in the acute cases are a lessening of the neuralgic pains in the hands and feet followed later by a gradual disappearance of numbness and a desquamation around the edges of the raised anaesthetic patches. In the subacute where the patches are more diffuse and are not raised, the same signs of relief of pains occur, and the patches gradually assume a smooth and healthy appearance. In both these types re-pigmentation starts in the centre of the patch and around the edges, but whereas the acute tend to become wholly pigmented, the subacute seem to stop at a certain stage and remain so, the skin becoming smooth and velvety.

In one acute anæsthetic case, of large flat angry red patches, numerous thread-like lines of pigmentation can be seen running through these patches.

In the acute nodular, the nodules tend to flatten out, desquamate and gradually disappear; this feature is more marked on the body than the face, the lobes of the ear being the slowest of all.

A few cases of the acute variety, during the treatment developed an intense re-action characterised by acute pains in the arms and legs with swelling of the hands and feet. All treatment was stopped and salicylates given. After a period of 10-14 days these acute symptoms subsided and the routine treatment was re-started without any recurrence of this sequelæ.

Improvement then appeared to become more rapid.

One case, a female, after 112 days under treatment has been discharged apparently cured. She had anæsthetic patches on the forehead, back of the left arm and on the back of the left forearm and wrist ; her patches have completely disappeared, the one on the forehead became hyperpigmented. She is to report in 3 months for observation.

Another, a male, with extensive anæsthetic patches on the right arm and forearm, thighs and buttocks has also been discharged, after 5 months' treatment all his pains disappeared after 3 months and although the patches are still visible the skin is smooth and velvety and no longer anæsthetic. This is a case which I class as arrested and to all intents and purposes the man is perfectly well.

From the results seen so far, I have great hopes that these cases admitted in the acute and subacute stages will eventually be discharged not as permanently cured, but as a non-contagious state to their respective villages as useful members of the community.

These observations are taken from cases under treatment up to 6 months, how much further a cure will develop remain to be seen.

F. H. COOKE,
Medical Officer

1st April, 1927.

APPENDIX D.
HOSPITAL ACCOMMODATION AND DISTRIBUTION OF EUROPEAN MEDICAL STAFF IN THE GOLD COAST.

Station.	European Hospital.	No. of beds.	Native Hospital.	No. of beds, and cots (if any.)	Dispensaries.	No. of Medical Staff.
<i>Colony.</i>						
Accra (Headquarters)	—	—	—	—	—	2
" (Hospitals) ..	1	19	1	225 plus 18 cots	2	5
" (Cantonments)	—	—	1	6	1	1
Sekondi ..	1	21	1	38 plus 1 cot	1	2
Cape Coast ..	1	3	1	30	1	1
Saltpond ..	—	—	1	10	1	1
Winneba ..	1	8	1	16	1	1
Ada ..	—	—	1	12	1	—
Keta ..	—	—	1	16	1	1
Kibi ..	—	—	1	19	1	1
Mpraeso ..	—	—	1	13	1	1
Dunkwa ..	—	—	1	16	1	—
Tarkwa ..	—	—	1	11	1	1
Axim ..	1	6	1	12	1	1
Nsawam..	—	—	1	4	1	1
Akuse ..	—	—	1	19	1	1
Koforidua ..	—	—	1	20	1	1
Elmina ..	—	—	1	10	1	—
Oda ..	—	—	1	10	1	1
Ho ..	—	—	1	20	1	1
Total for Colony ..	5	57	19	507 plus 19 cots	20	23

APPENDIX D.—*contd.*

Station.	European Hospital.	No. of beds.	Native Hospital.	No. of beds, and cots (if any.)	Dispensaries.	No. of Medical Staff.
ASHANTI.						
Kumasi ..	1	12	1	137	1	3
Bekwai ..	—	—	1	4	1	1
Sunyani ..	—	—	1	10	1	1
Kintampo ..	—	—	1	16	1	1
Obuasi ..	—	—	—	—	1	1
Total for Ashanti ..	1	12	4	167 plus 2 cots	5	7
NORTHERN TERRITORIES.						
Tamale ..	1	8	1	24	1	2
Wa ..	—	—	1	4	1	1
Zouaragu ..	—	—	—	—	1	1
Salaga ..	—	—	1	10	1	1
Kete Kratchi ..	—	—	—	—	1	1
Yendi ..	—	—	1	—	1	1
Total for Northern Territories ..	1	8	4	38	6	7

APPENDIX D.—*contd.*

SUMMARY.

Station.		European Hospital.	No. of beds.	Native Hospital.	No. of beds and cots, if any.	Dispensaries.	No. of Medical Staff.
Colony	..	5	57	19	507 plus 19 cots	20	23
Ashanti	..	1	12	4	167 plus 2 cots	5	7
Northern Territories	..	1	8	4	38	7	7
On leave	..	—	—	—	—	—	15
Grand Total	..	7	77	27	712	12	52

analysis.

Director of Medical and Sanitary Services	..	..	..	1
Deputy Director of Medical and Sanitary Services	..	..	..	1
Assistant Directors of Medical Service.	..	..	..	2
Specialists	..	..	..	3
Senior Medical Officers	..	..	..	6
Medical Officers	..	..	..	39
Total European Medical Staff	..	..	..	52

APPENDIX E.

MISCELLANEOUS.

During the course of the year many interesting Case Reports were sent in by Medical Officers and many comments of interest appeared in their Annual Reports. A few extracts from the latter will be found of interest also a selection of Case Reports.

Dr. A. L. Anthony, Acting Medical Officer, Obuasi, writes :—

“ The malarial rate has been low, and the only factor which calls for comment is a series of cases of (apparently) idiopathic bubo, mostly inguinal. I am more convinced than ever that there is always some latent septic focus however in these cases, which though not obvious, is nevertheless present and springs into activity during a period of depressed vitality. Treatment by aspiration through sound skin, and injection of Iodine gives good results even though the tapping may have to be repeated several times. Vaccine therapy is also useful. If near the end of a tour undoubtedly the best thing is to invalid straight away as the sea voyage acts in a most miraculous fashion.

Clinically the malaria here is, as I have reported before, nearly always of the gastro-intestinal type ushered in by vomiting and diarrhoea. Since 1919 and the more vigorous quinine campaign, the severity of these symptoms has been reduced in the most extraordinary manner. Only two cases (both European) have been noted during the year with cerebral symptoms, and both of these were mild. Many other clinical types present themselves, but in the main the gastro-intestinal type is predominant. This appears to be true of the African as well, and is often very marked in children.

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“ *Ascaris Lumbricoides*.—Undoubtedly one of the most serious problems. They seem to be almost universal and I do not doubt that they cause a number of unexplained deaths. Intestinal infestations are easily dealt with, but there still appears to be no remedy for extra-intestinal worms. It is noticeable that in nearly every case of death by G.S.W. involving the lungs, a round worm or two appear in the wound after a few hours, obviously from the lungs or chest cavity. The vast majority of children suffer from them and undoubtedly suffer much in physique and in mentality as a result of the depredations of these parasites. “ As long as their playground and dining table is mother earth infected with ova, as long are they likely to suffer. ”

Dr. S. L. Brohier, Medical Officer, Akuse, writes :—

“ *Bilharzial disease*.—There is probably more schistosomiasis in this district than is perhaps suspected. Of the 12 cases diagnosed as having occurred during the year 11 cases were seen during the last four months.

“ Patients come up complaining of gonorrhoea. Having doubtless contracted gonorrhoea some indefinite time previously, they very naturally refer their immediate symptoms (the result of the bilharzial infection) to the pre-existing attack of gonorrhoea. Short of a microscopic examination of the urine in all cases of what appear to be cases of acute prostatitis and cystitis, the true cause of the condition is likely to be overlooked. Treatment with antimony (intravenously) was undertaken with rapid benefit in all cases. ”

From Kibi Dr. A. G. Mackay writes :—

“ *Remarks of any Scientific Nature pertaining to a Medical Report.* ”

“ *A. Malignant Disease*.—One case of rectal cancer in an elderly woman was seen at Begoro on the visit of the Medical Officer there. One case of gastric cancer was treated in hospital (unfortunately, the diagnosis could not be confirmed post-mortem on account of the opposition of the relatives). Three cases of sarcoma were admitted as in-patients. Two were sarcoma of bone, and the other a small round celled sarcoma of cervical glands.

" B. *Paroxysmal Haemoglobinuria*.—A P.W.D. labourer was admitted to hospital on the 12th January complaining of the passage of black urine. He had a slight rigor on the morning of the 11th, and for the following two days had intermittent pain in the upper part of the abdomen, but no loin pain. He passed typical porter-coloured urine from midday on the 12th till the following morning.

" The amount of urine passed was not decreased according to his own statement. He had no temperature while in hospital. The haemoglobinuria suddenly ceased on the morning of the 13th and pale straw-coloured urine was passed. There was a history of a chancre on the penis five years previously with enlargement of the inguinal glands. He was discharged on the 14th and has had no recurrence.

" C *Weil's Disease*.—A clerk from the African Products Developments Plantation at Bunso was admitted to hospital at 1 p.m. on the 22nd March. He had been sick since the morning of the 20th (2½ days) with fever, headache, general pains, vomiting, and developing jaundice. Vomiting had been troublesome and persistent before admission, the colour being yellow. (It was said to be brown the day before admission). He vomited once on the day of admission—bilious vomit. The temperature was 102.6° and the pulse 152 when admitted. The same evening, the temp. rose to 104° and the pulse dropped to 120. Icterus was present, the urine contained much bile, and deposited about $\frac{1}{10}$ tube albumen on boiling. Treatment was quinine and soda bicarb, and glucose by the mouth. Blood smears (3) taken were negative for parasites. There was a leucocytosis (15,400) with a preponderance of polymorphs (87%), and only 3% large mononuclears. (I am obliged to Dr. Walcott of the Rockefeller Yellow Fever Commission for the figures of the blood count. He saw the patient the morning after admission). The albumen increased the next day to $\frac{1}{8}$ th tube, and there were a few small bile-stained granular casts. The eyes were deeply jaundiced.

" A stool passed in the early morning was reddish and watery. The temperature rose from 102.4° at 6 a.m. to 103.4° at 11 a.m., and then fell to 102.3° in the evening. The corresponding pulse rates were 120, 116, and 106. The gums were not congested. The following day, definite improvement set in the temperature falling to 99.5° in the evening and the pulse to 70. The bowels moved once—the stool was semi-solid and clay-coloured. The albumen decreased to a slight cloud. There was no vomiting after the first day of admission. There was epigastric tenderness and tenderness over liver and spleen (which were not enlarged) on the first day only. The temperature was normal on the 25th, and the pulse 64. There was no further rise of temperature. The pulse fell to 52. The jaundice disappeared steadily. The urine was free from albumen on the 27th, and the patient was discharged on the 3rd April. No spirochaetes were seen in blood or urine."

The interest of the last case is the diagnosis " Weil's Disease ".

It is given in full on account of its interest to investigators. The diagnosis however would seem doubtful.

Dr. J. M. O'Brien, Senior Medical Officer, Koforidua, writes:—

" *Malaria*.—Over 24% (roughly 1,000) of those attending as Out-patients during the last year were infants in arms. It may be said that all these suffered from malaria in combination or not with other diseases. Of the women who came for consultation in a very great majority, the disease complexes they presented, were influenced by malaria, most decidedly was this so amongst women in pregnancy in the puerperium and in the post puerperal state. Amongst a large proportion of the men, the effects of malaria can be noted.

" It is my opinion that every individual of the local population over a few weeks of age, and with rare exceptions, is infected frequently with malaria. A considerable proportion of these infections produce brief incapacitation. I think that few adults die as a result of these infections, but, that by its debilitating influence malaria is the greatest factor in the death rate.

" *Yaws*.—There are few persons reared in this neighbourhood who have not been infected with yaws, so much is this so that the natives have become admirable diagnosticians of the disease in its varying phases.

" Yaws is sometimes a potent accessory cause of death. It causes much permanent partial incapacitation.

“ *Pulmonary Tuberculosis.*

“ It is usually held that the West African has little resisting power to pulmonary tuberculosis.

“ Two large households have been under my observation (*a*) for over four years (*b*) three years. When I first knew household (*a*) the grandmother was still alive. She expectorated large numbers of bacilli in copious sputum from a cavity. She died in about six months.

“ Household (*b*) first brought me a girl about 18 years of age with haemoptysis, tubercle bacilli in the sputum, and clinical evidence of involvement of both lungs complete, with the exception of one lower lobe.

“ She was an excellent patient.

“ The disease became quiescent. Her father has told me of her recent death.

The sequence of events seems to have been :—

“ 1 dysuria, 2 general failing, 3, haemoptysis, 4 death.

“ Both of these households are frequently represented amongst the out-patients; no further tubercular disease has occurred amongst their members.

“ It is probable that in these two households together, 20 or 30 persons were for a considerable time exposed to infection. If one considers how in such households many sleep together in a closely shuttered room, lying on the floor breathing close to its dust, if one thinks of the uncontrolled coughing and spitting and of the moist warm air, it is perceived that the spread of infection is exceedingly favoured, and that they who escape, living under such circumstances, must offer a powerful resistance to the tubercle bacillus, I venture to think that with the amount of pulmonary tuberculosis extant in the Gold Coast, the disease would be epidemic, and not sporadic were it not that this powerful resistance is found in the average West African. *Syphilis* is not common in this district, a fact which I am inclined to attribute to a partial protection by yaws infection. *Bilharziosis*, hæmaturia is found principally in young boys and apparently gives rise to but little inconvenience. On the other hand, some cases of urethritis, chronic prostatitis and cystitis of an acutely painful character, are perhaps due to an earlier bilharzia infection; these conditions yield, if at all, only partially to antimony, perhaps owing to the superimposition of other infections on bilharzia ulceration.

“ No doubt this question will be elucidated by the cystoscope and the complement fixation test.

The following cases are reported as being of interest :—

(1) *A case of Acute Lymphatic Leukaemia reported by Dr. A. C. Paterson, Medical Officer, Saltpond.*

There have been one or two cases of special interest in Saltpond during the year.

Case 1. *Acute Lymphatic Leukaemia Complicating Pregnancy.*—A young adult woman was brought to me about two months ago with the history of extreme weakness, breathlessness, palpitation and dyspepsia. She had never been ill before in her life. She was about six months pregnant.

The illness commenced only three weeks previously. On examination I found her extremely anæmic, mucous membranes being absolutely blanched lymphatic glands all over the body slightly enlarged, spleen slightly enlarged, no enlargement of the liver. No sign of epistaxis or hæmatemesis.

The weakness rapidly became more marked, oedema appeared and she began to have little attacks of fever.

Towards the end she gave birth to a premature still-born child. After this there was a slight improvement, but it was shortlived. The pyrexia attacks became more marked, the oedema and dropsy quickly increased and death occurred within 10 weeks of the onset of the disease.

The blood was extremely thin and pale—almost yellowish—and it was very difficult to film out on a slide.

The lymphocytes were markedly increased forming about 90% of the leucocytes. There were a few nucleated red cells.

Anisocytosis and poikilocytosis present.

The leukaemias are rare, and the acute leukaemias are said to be extremely rare. This is the third case of leukaemia I have seen in the last two years, and curiously enough they have all been of the acute lymphatic type.

This case is also of interest on account of the fact that the disease commenced during pregnancy. When leukaemia appears in connection with pregnancy it generally follows it.

(2) *Dr. V. E. Critien, Medical Officer, Axim reports in detail the following two cases of dengue.*

Notes on an attack of dengue, 27th November to 6th December, 1926.

Premonitory Symptoms.

No malaise, for two days 25th and 26th November, unduly irritable.

Onset.—Sudden 27th November, afternoon tired feeling, pains in joints especially knees on walking, confused feeling in head but no actual headache. Temp. 4 p.m. 101°. I took a slide of my blood and examined it. No parasites were seen and no increase in mononuclears.

I retired to bed, temp. at 7 p.m. was 101.6; during the night I suffered from insomnia, slight but frequent shivers down the back and spine and pains in joints and lumbar region. The pains were not severe.

On the morning of the 28th I had distinct pains in the ocular muscles and eyeballs, slightly congested conjunctivæ and slight congestion of the throat.

My tongue was coated but not thick and flabby, and the tip and edges were red. I had no nausea and no epigastric tenderness. My spleen was just palpable on deep inspiration and slightly tender.

There was also slight tenderness over the liver.

Rash.—A rash was distinctly visible on the morning of the 28th. Its characters were at first papulo-vesicular.

Distribution widespread, most pronounced on back, buttocks and chest, also present on arms, forearms and thighs—face and forehead not involved.

A few of the vesicles, about 8 in number on the buttocks, had by the second day 29th developed into small pustules—the large majority of the papules however did not advance beyond the papular stage.

On the 30th the rash altered its characters and was more of a diffuse maculopapular eruption. Its distribution remained unaltered except for the appearance of a few macules on the forehead. The individual papules were slightly raised and faded on pressure. On the 30th there was a diffuse erythema between the papules, the unaffected areas of the skin standing out like white spots on a congested ground.

On the 1st, the rash faded and did not return.

The initial congestion of eyes and throat never pronounced subsided by the 3rd day, viz., 29th. The insomnia however was very persistent, and articular and bone pains though not severe continued present.

On the night of the 29th—3rd day—temp. fell from 103.4 to 99, the fall being accompanied by profuse sweating. All symptoms were relieved, but with the gradual descent of the temperature on the 30th, there was a very marked exacerbation of the lumbar, joint and bone pains—most prominent in the lower extremities, the rash and the ocular region.

These pains now became very severe and remained so until the second drop in the temperature on the 2nd December, the 6th day of the disease.

This second fall of temperature was also accompanied by much sweating. Convalescence was established on the 3rd December, 7th day since onset.

Pulse.—The pulse was comparatively slow throughout.

There was a tendency towards constipation, the urine was normal and no albumin was present.

A temperature chart is attached.

Treatment.—Liquid diet.

Mist. Alba and laxatives as required.

Aspirin for relief of pains.

Quinine gr. V. daily was continued as usual.

Remarks.

- (1) Rash at onset suggested chicken-pox.
- (2) Many of the papules considered individually were reminiscent of a typhoid papule and the other signs and symptoms and the evolution of the illness precluded typhoid, or paratyphoid.
- (3) The character of the pains especially on the second rise of temperature, the slow pulse and the character of the fully developed rash on the 4th day, together with the subsequent evolution of the disease confirmed to my mind the diagnosis of dengue, the more so in view of the fact that a typical case of dengue had come under my observation two months previously in the same district.

A few notes and a chart of this latter case are appended as it is thought they might be of interest.

Sequelae.—Convalescence was rapid.

Up to present date, 10th December, there have been no signs of any partial return of a rash no pains and no signs of any sequelae, except that insomnia still persists though not in a severe form.

CASE II.

Brief notes on a case of dengue at Axim, July 29th to August 7th; female, age 26; European.

Prodromata.

For two days previous to initial fever lassitude and pelvic pains.

Onset. Aching of eyeballs, headache, chill, severe muscular and joint pains; temp. 101°, rising to 103°.

On the evening of the 1st day an erythematous eruption appeared distributed over back, chest and extremities. It faded and disappeared by the next morning, 2nd day of illness.

On July 30th, 2nd day of illness, patient had a markedly swollen face, and congestion of conjunctivae and mucous membranes of mouth and pharynx.

The muscular and bone pains increased in severity and became excruciating.

Lumbar and pelvic pains and pain in joints and bones of lower extremities was much complained of, also pain in neck and orbit. On August 1st, 3rd day of illness, temperature came down to 99° the fall being marked by moderate sweating and a general amelioration in the symptoms. Temp. on following days varied between normal and 100°.

On August 2nd, 4th day of illness, the rash reappeared first on forearms, later on trunk, thighs and legs. It commenced as an erythematous flush, fading on pressure, and steadily involving a larger and wider area until finally the unaffected parts of the skin stood out as white patches on the congested background. The rash in its evolution and characters followed very closely the description given in Manson-Bahr's textbook on Tropical Diseases, latest edition 1925.

Indeed the patient's forearms and arms were on the 3rd August—5th day of illness and time of maximum intensity of rash—an exact replica, though in less brilliant colours of the picture given in the textbook.

The rash was fading on August 4th and had faded by August 5th. No examination of symptoms on rise of temperature accompanied the rash.

The spleen was not palpable and not tender; the liver was tender. Blood examination showed nothing abnormal (blood count was not made) no parasites were present.

Repeated examination of urine was negative to tests of albumin. There was no nausea and no vomiting, but patient showed a disinclination to partake of even liquids.

Pulse and temperature are shown on attached chart.

Treatment was on general lines—mustard baths and aspirin during first stage—laxatives, and in short, treatment was symptomatic.

Sequelæ. Convalescence was very protracted. Physical weakness was at first pronounced. Pains in joints and especially back of neck were very persistent, and lasted while gradually diminishing about 2½ months.

Appetite remained very low for over a month.

The rash frequently reappeared on arms and forearms, fading away again after a few hours in a few minutes. The rash on forearms, even now over 3 months since the illness still occasionally reappears, especially when the arms are kept in a position that would promote a flow of blood to the part.

There was also a distinct loss in weight.

Remarks. (1) Onset was suggestive of a mild case of yellow fever.

(2) The rash was typical of dengue—both in evolution, distribution and characters, and the diagnosis was certain in the 4th day of illness.

(3) The most prominent signs and symptoms of the initial stage were the very swollen face and the severity of the pains.

(3) *The following selected case of yellow fever is reported by Dr. C. V. Le Fanu, Medical Specialist.*

H. R. Hollis, aged 28, an employee of Messrs. F. & A. Swanzy's Motor Transport. He had completed eight months of his second tour of residence in the Colony. He had usually enjoyed good health, but had several attacks of 'fever', probably malarial, during his first and one in his second tour. For the last three weeks preceding his last illness he was stationed in Akuse. He had slept the night from the 23rd to the 24th November in Accra.

27th November. He was seen early this morning by the Medical Officer, Akuse, and was apparently perfectly well. He motored in from Akuse, a distance of 53 miles, and arrived in Accra about 11 a.m. saw the dentist and lunched with friends remaining with them until between 3 and 4 o'clock. Malaise and headache set in shortly after 4 p.m. while he was on his way to his quarters.

28th November. Had not slept well and had vomited two or three times. Malaise, headache, fever. Bowels acted repeatedly had taken salts early in the morning and passed urine freely during the day until 4 p.m.

Admitted into hospital at 7 p.m. Rather heavy build, muscular. Had the appearance of a man suffering from an ordinary, not severe attack of malaria. Complained of headache and lassitude. A blood smear was taken and found free of malarial parasites. He was ordered to be screened as a routine precaution.

29th A restless night with diarrhoea and vomiting. He was tired, but not apparently very ill. Headache was not excessive. He complained, on being questioned, of slight epigastric tenderness and pain on swallowing. The stools passed during the night were at first mucoid. Later liquid and greenish in colour. No urine had been consciously voided since 4. p.m. the previous day. He had vomited five times and the last vomit, at 7 a.m., consisted of 15 oz. of watery fluid, alkaline in reaction, containing a little altered blood. 10 a.m. Slight generalised flushing of skin, no jaundice, no rash. Conjunctivæ were not injected, but there was definite icterus, if very faint. Gums normal. Tongue was pointed, narrow, clear at tip and edges. Coated along centre with prominence, near the tip, of papillæ. Heart and lungs normal. No enlargement of liver or spleen. Earlier in the morning one ounce of slight dark amber, clear urine had been withdrawn by catheter; Reaction acid, Sp. gr. 1015, albumin $\frac{1}{4}$ of tube (after boiling and settling for 3 hours), numerous large, bile-stained granular casts: no blood corpuscles. Blood smears examined for malarial parasites (Dr. Walcott) were again negative. Leucocyte count 13,600 with 90% polymorphs.

6 p.m. No repetition of vomiting. Stools consisted of creamy material of a dirty white colour. There was tenderness on deep pressure in the right flank.

30th. Another restless night. During the morning, at times a little drowsy, but quite rational. Complains most of difficulty and pain in swallowing. At 10 a.m. Hiccough which was controlled by $\frac{1}{2}$ grain cocaine hydrochlor, given by mouth. Jaundice general, but moderate. Gums still quite normal. Tongue same as previous day. Stools small, like thin putty. No rash. 1 $\frac{1}{2}$ oz of urine withdrawn by catheter: reaction alkaline; amber colour and slightly turbid: albumin at $\frac{1}{3}$ the height of column of urine after settling for 2 hours: granular casts present, but fewer. 1. p.m. Stools became a dark slate colour. An area of redness surrounding the anus was noted. 3 p.m. Glucose intravenously in 1 pint of water 4 p.m. Black vomit set in and became frequent. 6 p.m. The patient was still quite rational 7 p.m. Rather suddenly became wildly delirious and an hour later sank into coma. Respiration with onset of delirium, became rapid and laboured. Pulse irregular; small, rising to over 90. Temperature at 10-30 p.m. 105.4 in axilla.

11.50. Death.

1st. December, 1926: A post-mortem examination was made by Dr. Young, Director of Medical Research.

Note I am indebted to Dr. Walcott of the Rockefeller Institute for his assistance and also for permitting me to see his notes of which I have made use in this report.

4. *A Case of blackwater fever in a European treated by intravenous quinine reported by Dr. A. C. Paterson, Medical Officer, Saltpond.*

This case is of interest on account of the marked reaction to intravenous quinine.

The patient was an Italian Contractor who lived in the native quarter.

It was a typical case of blackwater fever with the usual history and presenting the usual clinical features, details of which I shall not mention as the interest in the case lies in the marked reaction to treatment.

The patient was in the Hospital within 6 hours of the onset. Scanty rings were found in the blood on admission. The line of treatment carried out was as follows:—

Absolute rest; hot water bottles to loins and limbs; Sternberg's mixture every two hours; large amounts of fluids by the mouth, milk and soda, barley water and glucose, alkaline drinks.

Laxatives withheld.

In the afternoon of the day of admission I gave quinine bihydrochloride (Burroughs Wellcome ampoules) grs. 12 intravenously by the following method :— The quinine is drawn into a record syringe from the ampoules *without any dilution* and injected slowly into a vein. The three important points to my mind are :—

The quinine should be given at the earliest possible opportunity. The non-dilution of the quinine, and the time taken over the introduction.

With a concentrated quinine preparation the action is far more marked but attention must be paid to the time taken over the injection. It should be done slowly, taking 15 or 20 minutes to inject 12 grains. The patient should have tinnitus aurium by the time half the quinine has been given.

In this case the patient, although profoundly anæmic and very weak said he felt a definite improvement next morning and that morning's specimen of urine was much lighter in colour.

In the afternoon (2nd day) I gave another intravenous injection of quinine grs. 12, following the same method. After the second injection the temperature fell rapidly, and was normal on the morning of the third day, and the hæmoglobin had disappeared from the urine.

No more intravenous quinine was given, but quinine grs. 5 by mouth was given in the evening of the third day.

Thereafter quinine grs. 10 by mouth was given daily in two doses. The bowels were opened on the morning of the fourth day by Ol. Ric.

The patient made a rapid recovery.

APPENDIX F (I).
ACCRA WATER SUPPLY.

BACTERIOLOGICAL EXAMINATION OF SAMPLES FROM RESERVOIRS, FINAL FILTERS
AND LABORATORY TAPS, APRIL, 1926-MARCH, 1927.

+ = Smallest volume of water yielding B. Coli.

— = Absence of B. Coli in the respective volumes stated at head of columns.

Adopted test of typical B. Coli.— Lactose-positive.
Indol-positive.

Date.	Source of Sample.	100cc.	10cc.	1cc.
April 1	Final Filter No. 2	—		
"	Laboratory Tap.	—		
8	Laboratory Tap.	—		
8	Final Filter No. 3	—		
	Storage Reservoir No. 2	—		
15	Laboratory Tap	—		
"	Final Filter No. 4	—		
22	Laboratory Tap	+		
"	Final Filter No. 5	—		
"	Storage Reservoir No. 3		+	—
29	Final Filter No. 6	—		
"	Laboratory Tap	—		
May 6	Laboratory Tap		+	—
"	Final Filter No. 1	—		
"	Storage Reservoir No. 2	+	—	
13	Laboratory Tap	+	—	
"	Final Filter No. 2	—		
20	Storage Reservoir No. 2		+	—
"	Final Filter No. 3	+	—	
"	Laboratory Tap	+	—	
27	Laboratory Tap	+	—	
"	Final Filter No. 4	+	—	
June 2	Storage Reservoir No. 1	—		
"	Final Filter No. 5	—		
"	Laboratory Tap	—		
10	Laboratory Tap	—		
"	Final Filter No. 6	—		
17	Laboratory Tap		+	—
"	Storage Reservoir No. 1		+	—
"	Final Filter No. 1	+	—	
24	Laboratory Tap	+	—	
"	Final Filter No. 2	+	—	
July 1	Laboratory Tap	+	—	
"	Final Filter No. 3	—		
"	Storage Reservoir No. 1		+	—
8	Laboratory Tap	—		
"	Final Filter No. 4	—		
15	Laboratory Tap	—		
"	Final Filter No. 5	—		
"	Storage Reservoir No. 1		+	—
22	Laboratory Tap	—		
"	Final Filter No. 6	—		
29	Laboratory Tap	—		
"	Storage Reservoir No. 2		+	—
"	Final Filter No. 1	—		
Aug., 5	Laboratory Tap	+	—	
"	Final Filter No. 2	+	—	
12	Laboratory Tap	+	—	
"	Final Filter No. 3	—		
"	Storage Reservoir No. 2	—		

APPENDIX F 1.—*contd.*

ACCRA WATER SUPPLY.

Date.	Source of Sample.	100cc.	10cc.	1cc.
Aug. 19	Laboratory Tap	—		
„	Final Filter No. 4	—		
26	Laboratory Tap	—		
„	Final Filter No. 5	+	—	
„	Storage Reservoir No. 2	+	—	
Sept. 2	Laboratory Tap	—		
„	Final Filter No. 6	—		
9	Laboratory Tap	—		
„	Storage Reservoir No. 2	—		
„	Final Filter No. 1	—		
16	Laboratory Tap	—		
„	Final Filter No. 2	—		
23	Storage Reservoir No. 1	—		
„	Final Filter No. 3	—		
„	Laboratory Tap	—		
30	Laboratory Tap	+	—	
„	Final Filter No. 4	—		
Oct. 9	Laboratory Tap	—		
„	Final Filter No. 5	—		
„	Storage Reservoir No. 1	—	—	
14	Laboratory Tap	—		
„	Final Filter No. 6	—		
21	Laboratory Tap	—		
„	Storage Reservoir No. 1	+	—	
„	Final Filter No. 1	—		
28	Final Filter No. 2	—		
„	Laboratory Tap	+	—	
Nov. 4	Laboratory Tap	—		
„	Final Filter No. 3	—		
„	Storage Reservoir No. 1	+	—	
11	Final Filter No. 4	—		
„	Laboratory Tap	—		
18	Laboratory Tap	—		
„	Storage Reservoir No. 2	—		
„	Final Filter No. 5	—		
25	Final Filter No. 6	—		
„	Laboratory Tap	—		
Dec. 2	Laboratory Tap	—		
„	Storage Reservoir No. 2	—		
„	Final Filter No. 1	—		
9	Laboratory Tap	—		
„	Final Filter No. 2	—		
16	Storage Reservoir No. 2		+	—
„	Final Filter No. 3	—		
„	Laboratory Tap	+	—	
23	Final Filter No. 4	—		
„	Laboratory Tap	+	—	
30	Laboratory Tap	+	—	
„	Storage Reservoir No. 2	—		
„	Final Filter No. 5		+	—
Jan. 6	Laboratory Tap	—		
„	Final Filter No. 6	—		
13	Laboratory Tap	—		
„	Storage Reservoir No. 1	—		

APPENDIX F I.—*contd.*

ACCRA WATER SUPPLY.

Date.	Source of Sample.	100cc.	10cc.	1cc.
Jan. 13	Final Filter No. 1	+	-	
20	Laboratory Tap	-		
27	Final Filter No. 3	-		
„	Storage Reservoir No. 1	+	-	
„	Laboratory Tap	-		
Feb. 3	Final Filter No. 5	-		
„	Storage Reservoir No. 1	+	-	
„	Laboratory Tap	-		
10	Laboratory Tap	-		
„	Final Filter No. 4			
Feb. 17	Laboratory Tap	+	-	
„	Final Filter No. 6	-		
24	Laboratory Tap	-		
„	Storage Reservoir No. 2	+	-	
„	Final Filter No. 1	-		
Mar. 3	Final Filter No. 2	+	-	
„	Laboratory Tap	-		
10	Laboratory Tap	+	-	
„	Final Filter No. 4	-		
„	Low Level Reservoir No. 2	-		
17	Laboratory Tap	+	-	
„	Final Filter No. 5	+	-	
24	Laboratory Tap	+	-	
„	Final Filter No. 6	-		
„	Low Level Reservoir No. 2	+	-	
31	Laboratory Tap	+	-	
„	Final Filter No. 1	-		

APPENDIX F (II).

ACCRA WATER SUPPLY.

It may be of some interest to compile in a tabular form the results of the bacteriological analyses of the Accra Water Supply for the past few years for purposes of comparison. This is done hereunder.

January to December, 1921.

Source of Sample.		Total number of Samples.	Number negative in 100cc.	Number showing B. coli in 100cc. 100cc or less.		Percentage * of Samples showing no B. coli in 100cc.	
Storage Reservoir	No. 1 ..	13	9	2	2	69.23%	Average percentage 72%.
" "	No. 2 ..	12	9	3	—	75.0%	
Final Filter	No. 1 ..	10	7	1	2	70.0%	Average percentage 73.1%
" "	No. 2 ..	8	7	—	1	87.5%	
" "	No. 3 ..	9	8	—	1	88.8%	
" "	No. 4 ..	10	4	2	4	40.0%	
" "	No. 5 ..	7	6	—	1	85.7%	
" "	No. 6 ..	8	6	2	—	75.0%	
Total and standpipes in the town.		18	14	1	3	77.7%	
January to December, 1922.							
Storage Reservoir	No. 1 ..	11	6	2	3	55.5%	Average. percentage. 57.7%
" "	No. 2 ..	13	9	3	1	69.2%	
Final Filter	No. 1 ..	9	7	2	—	77.7%	Average percentage. 79.6%
" "	No. 2 ..	8	6	2	—	75.0%	
" "	No. 3 ..	10	8	2	—	80.0%	
" "	No. 4 ..	7	7	—	—	100.0%	
" "	No. 5 ..	12	7	3	2	58.3%	
" "	No. 6 ..	8	8	—	—	100.0%	
Taps and standpipes in the town.		26	10	10	6	34.6%	
January to December 1923.							
Storage Reservoir	No. 1 ..	11	5	6	6	45.4%	Average percentage 33.3%
" "	No. 2 ..	16	4	8	4	25.0%	
Final Filter	No. 1 ..	7	7	—	—	100.0%	Average percentage 71.1%
" "	No. 2 ..	8	7	1	—	87.5%	
" "	No. 3 ..	9	5	4	—	55.5%	
" "	No. 4 ..	9	6	2	1	66.6%	
" "	No. 5 ..	10	5	4	1	50.0%	
" "	No. 6 ..	9	7	2	—	77.7%	
Taps and standpipes in the town.		26	10	14	2	38.4%	
April 1924 - March, 1925.							
Storage Reservoir	No. 1 ..	12	3	8	1	25.0%	Average percentage. 25.0%
" "	No. 2 ..	12	3	6	3	25.0%	
Final Filter	No. 1 ..	9	8	—	1	88.8%	Average percentage 82.7%
" "	No. 2 ..	8	7	1	—	87.5%	
" "	No. 3 ..	8	7	1	—	87.5%	
" "	No. 4 ..	11	6	5	—	54.5%	
" "	No. 5 ..	8	7	1	—	87.5%	
" "	No. 6 ..	8	8	—	—	100.0%	
Laboratory tap and stand pipes in the town.		10	5	5	—	50%	

APPENDIX F II.—*contd.*

ACCRA WATER SUPPLY.

April, 1925—March, 1926.

Source of Sample.				Total number of Samples.	Number negative in 100cc.	Number showing B coli in 100cc., 10cc or less.		Percentage of Samples showing no B. coli in 100cc.	
Storage Reservoir No. 1 ..				15	9	2	4	60%	Average percentage 62.5%
" " No. 2 ..				9	6	3	—	66.6%	
Final Filter No. 1 ..				9	7	2	—	77.7%	Average percentage 78.0%
" " No. 2 ..				8	5	3	—	62.5%	
" " No. 3 ..				8	7	1	—	85.0%	
" " No. 4 ..				9	6	3	—	66.6%	
" " No. 5 ..				8	7	1	—	85.0%	
" " No. 6 ..				8	7	1	—	85.0%	
Laboratory Tap ..				52	33	16	3	63.46%	
April 1926 - March 1927.									
Storage Reservoir No. 1 ..				11	4	3	4	36.4%	Average percentage 40%
" " No. 2 ..				14	6	4	4	42.8%	
Final Filter No. 1 ..				9	7	2	—	77.7%	Average percentage 81.1%
" " No. 2 ..				9	6	3	—	66.6%	
" " No. 3 ..				8	7	1	—	87.5%	
" " No. 4 ..				9	8	1	—	88.8%	
" " No. 5 ..				9	6	3	—	66.6%	
" " No. 6 ..				9	9	—	—	100.0%	
Laboratory Tap.				53	33	17	3	62.28%	

These tables may be summarised as follows :—

PERCENTAGE OF SAMPLES SHOWING NO B. COLI IN 100 CC.

Year.	1921	1922	1923	1924-25	1925-26	1926-27
Storage Reservoir	72.0	57.7	33.3	25.0	62.5	40.0
Filter Beds	73.1	79.6	71.1	82.7	78.0	81.1
Taps and standpipes in the town	77.1	34.6	38.4	50.0	63.46	62.28

Thus it will be noted that there is a consistent drop in the purity of the water somewhere between the filter beds, *i.e.* filter effluents and the domestic tap. During the years 1925 and 1926 and 1926 and 1927, the tap whence the samples were taken was invariably the laboratory tap.

APPENDIX III.
SEKONDI WATER SUPPLY.

BACTERIOLOGICAL EXAMINATION OF SAMPLES FROM RESERVOIRS, LABORATORY
TAPS AND TOWN STANDPIPES, SEPTEMBER 1926, to MARCH 1927.

+ = Smallest volume of water yielding B. Coli.

- = Absence of B. Coli in the respective volumes stated at head of columns.

Adopted test of typical B. Coli. — ^{Lactose-positive.}
Indol-positive.

Date.	Source of supply.	100cc	10cc	1cc
Sept. 25.	Laboratory Tap (1)		+	—
30	Laboratory Tap (2)	+	-	
Oct. 7	Laboratory Tap	+	-	
14	Soda Water Factory Location	-		
14	Laboratory Tap (3)	+	-	
21	Boundary Road Standpipe	+	-	
28	Inchaban Water Works	-		
„	Location Reservoir	-		
	Essikadu	+	-	
Nov. 11	Sekondi Water(exact source not stated)	+	-	
18	Laboratory Tap	+	-	
28	Laboratory Tap	+	-	
Dec. 2	Laboratory	+	-	
9	Laboratory Tap	+	-	
16	Laboratory Tap	+	-	
24	Laboratory Tap	+	-	
Jan. 6	Laboratory Tap	+	-	
13	Laboratory Tap	+	-	
20	Laboratory Tap	—		
27	Laboratory Tap (4)		+	—
Feb. 1	Standpipe Essikadu	+	-	
3	Laboratory Tap	-		
„	Standpipe Boundary Road	+	+	—
10	Laboratory Tap	-		
17	Laboratory Tap	-		
26	Sekondi Tap (probably laboratory)	+	-	
Mar. 3	Laboratory Tap		+	—
14	Standpipe Boundary Road		+	—
„	Laboratory Tap	-		
17	Laboratory Tap	+	-	
24	Laboratory Tap	-		
31	Laboratory Tap	-		
	(1) B. proteus found in 10cc but not in 1cc.			
	(2) B. proteus found in 100cc but not in 10cc.			
	(3) B. faecalis alkaligenes found in 100cc but not in 10cc.			
	(4) B. faecalis alkaligenes also present.			

EXTRACT FROM A REPORT ON THE FILTERS AT THE SEKONDI WATER WORKS.

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12. In order to get a colourless final water it is found necessary to use 8 to 10 parts per 100,000 of aluminium sulphate (17% to 18%) and a proportion of the floc and alumina in solution reaches the final filters. The water from the final filters being satisfactory.

13. A chlorinator has been in use as an extra safeguard and the water from the proposed new plant will be chlorinated at the pump house.

14. The efficiency of the new installation will be tested at the effluent from the new filters, *i.e.* without Chlorination, and before the present final filters.

15. The water to be treated is practically free from silt and yields 0.106 to 0.038 Albuminoid of Ammonia, and 2.18 to 0.40 Oxygen absorbed in four hours at 80° F. per hundred thousand with colour from over 60 m.m. to 70 m.m. Burgess; the figures referring to water filtered through paper.

These colour figures are beyond the scale of the Burgess Chlorimeter and are obtained approximately by comparing lesser depths with the standard solution. (The standard solution contains 0.05 gm. of potassium bichromate and 1.00 gm. of crystallised cobalt sulphate per litre and the result is the number of millimeters of this solution which give an equal colour to 61 m.m. (2' 0") of the sample).

16. The final water to the Clear Water Well generally contains 0.010-0.012 Albuminoid Ammonia and 0.1 Oxygen absorbed with a colour about 20 m.m. The extreme limit of colour permitted in the final water is 25 m.m.

17. It is necessary to use 8-10 parts of Aluminium Sulphate per hundred thousand to remove the colour and when the water is at its worst it is necessary to take the P.h. value to about 5.0 this resulting in a small quantity of alumina being left in solution which is removed when the water becomes more alkaline in the final filters.

18. The P.h. value of the final water has been about 8.2.-8.4. and this has had considerable action on all the pipes in the Sekondi system. It is proposed to add a small quantity of lime to the water leaving the new filters, the bulk being added afterwards to protect the system.

19. Sample analyses of water are given below, those from the prefilter being after removal of floc by paper filtration.

				Raw Water.		Prefilter.	Final filter.
				Total.	In Solution.		
25-5-26.							
Albuminoid Ammonia	..	..		0.043	0.036	0.016	0.011
Oxygen Absorbed	..	..		0.54	0.52	0.15	0.11
Total Solids	..	..	..	14.8	14.2	15.3	18.9
Floc entering prefilter .. 1.0				Original floc 3.6			
16-6-26.							
Albuminoid Ammonia	..	..		0.095	0.094	0.018	—
Oxygen Absorbed	..	..		1.84	1.77	0.20	—
Floc entering prefilter .. 1.7				Original floc 9.7			
22-6-26.							
Albuminoid Ammonia	..	..		0.058	0.056	0.016	0.010
Oxygen Absorbed	..	..		1.24	1.21	0.19	0.12
Total Solids	..	..	..	14.6	14.1	14.1	11.9
Colour	..	..	..		380mm	23mm	21mm
Floc entering prefilter 1.8 parts;				Original floc 6.2			

Typical mineral analyses are given below :—

						Raw Water.	Prefilter.	Final Filter.
Silica	..	..	..	..	..	1.48	1.16	0.94
Oxides of Iron and Alumina	..	..	..	..	..	0.44*	0.24†	0.14†
Lime	(CAO)	..	..	..	..	0.40	1.66	0.20
Magnesia	(MGO)	..	..	..	..	0.69	0.68	0.74
Soda	(NA ₂ O)	..	..	..	..	2.48	2.65	2.71
Carbonic Anhydride (CO ₂)	..	..	..	..	..	1.43	0.11	2.09
Sulphate Anhydride (SO ₃)	..	..	..	..	..	0.77	4.03	4.50
Chlorine (Cl)	..	..	..	..	..	2.45	2.45	2.45
Nitric Anhydride	..	..	..	..	..	0.04	0.02	0.04
						10.18	13.00	13.81
Less Oxygen equivalent to Chlorine	..	..	..	..	..	0.55	0.55	0.55
						10.63	12.45	13.26
Moisture etc.,	..	..	..	..	..	5.47	2.65	2.54
Total solids in solution	..	..	..	..	..	16.1	15.1	15.8

* Principally Oxides of Iron.

† Principally Oxides of Aluminium.

The amount of Alumina present in the final water normally is 0.10 per 100,000.

20. The weight of the floc produced generally is 6-8 parts per 100,000 after drying at 105°C, when this is settled as a thick sludge it contains 100 to 200 times its weight of water. About three-quarters of the floc is retained in the sedimentation tanks.

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Regular bacteriological analyses of the Sekondi Water Supply were commenced towards the end of September, 1926, and it will be seen from a perusal of these figures that thirty-two samples in all were taken for bacteriological analyses from the end of September, 1926, till the end of March, 1927. Until a series of analyses over a full year has been studied it would be somewhat misleading to deduce general conclusions from this short series; but it must nevertheless be pointed out that of these thirty-two samples, twenty-three were from the laboratory tap presumably as being more convenient and more easily sterilised than the usual town standpipe. These samples showed that *B. coli* or other faecal bacilli were found in thirteen instances in 100 c.c. but not in 10 c.c., in three instances in 10 c.c. but not in 1 c.c., while only in seven cases was their absence demonstrated in 100 c.c.

During the first four months of 1922 sixteen samples were taken from various taps and standpipes in the town and only one of these showed *B. coli* in 100 c.c. absent in 10 c.c. Fifteen showed no *B. coli* in 100 c.c.

Beyond pointing out these results no useful comments can, on the figures available, be made but it should be noted that the results for the last two months show an improvement.

The water is derived from the Anankwan river and impounded in a reservoir. As it is drawn off a concentrated water solution of aluminium sulphate is added to a constant rate of 1 litre per minute giving an amount equal to eight parts per 100,000 of raw water.

The treated water is allowed to settle for a short time, passed through two sets of gauze screens to collect as much as possible of the unsettled floc and then filtered through coarse sand filters. It is next aerated and passed through fine sand filters into a clear water tank. At this point, a small amount of lime is added. (.66 parts of calcium hydrate per 100,000). From the clear water well the filtered water is pumped to Sekondi service reservoir, chlorine gas being injected into the pump suction pipe at the rate of five and a half parts per million since December, 1926.

During September and October, 1926, the amount of chlorine was nine parts per million as there was some doubt as to whether the diffusers were acting properly, but orthotoluidine tests showed free chlorine in the pumping main and complaints were received about the taste of the water; so the amount was cut down to seven and a half and six parts per million by the end of October.

APPENDIX G.

MOSQUITO PROOFING—OFFICIALS' QUARTERS.

Province.	Permanent Quarters.	Temporary Quarters.	Bush Quarters.	Number partly protected.	Completely Protected.
Accra	200	—	—	4	—
Eastern Province ..	47	14	4	4	—
Central Province ..	37	17	11	1	—
Western Province ..	70	6	13	20	—
Ashanti	92	—	—	3	—
Northern Territories	30	—	—	2	—

